

Virginia Department of Environmental Quality  
2002 Water Quality Assessment 305(b) and  
Impaired Waters Listing 303(d) Reports  
Public Comment Issues and Responses

A copy of all public comments received on the 2002 303(d) and 305(b) reports has been submitted to the US Environmental Protection Agency for their records. A complete list of comment submitters is included in this document. A number of the comments submitted raised issues not directly related to the 305(b) Water Quality Assessment or 303(d) Impaired Waters Reports. Those comments were not responded to in this document. These included:

- Add additional user friendly features to the web-based mapping application.  
(Paul Lancaster, City of Blacksburg) **Some additional features are being considered.** Appreciate the fact sheets and maps that are available on the web site.  
(Patricia Jackson, Lower James River Association)
- Suggestions for changes in how data was represented in a presentation used during the public comment period. (Ram Gupta, Ph.D., Chesapeake Bay Local Assistance Department).  
**This presentation will be revised based on information in the final reports.**
- Need target dates for implementation of Total Maximum Daily Loads  
(Lower James River Association)
- Concern over nonpoint source and agricultural enforcement policies and regulations and a lack of coordination between state environmental agencies on this issue  
(Lower James River Association)
- Concern over use of mixing zones with permitted discharges to state waters  
(Lower James River Association)
- Opposition to changing the fecal coliform standard (to E-coli)  
(Lower James River Association)
- Improve water quality in Southwest Virginia (Eulane Hamm, The Clinch Coalition)
- Comparison of disease risk due to fecal coliform from wildlife versus wastewater treatment and/or agriculture (Martin Lowney, USDA Wildlife Services)
- Current level of polluted waters in Virginia is unacceptable (Caryl Burtner)
- Distinction needed between water quality standards for free flowing waters versus impounded reservoirs (Thomas Bonacquisti, Fairfax County Water Authority)
- Resubmitted assessment guidance comments (Chris Pomeroy, VAMWA) (previously responded to these comments after a prior public comment period)

In addition, there were questions raised about the listing of specific waters. These are addressed in this document and were raised by:

- Thomas Bonacquisti, Fairfax County Water Authority + others (Occoquan Reservoir)
- Norm LeBlanc, Hampton Roads Sanitation District  
(EPA overlisted main stem tributary rivers)
- Frank Harksen, Jr., Hanover County (South Anna and Pamunkey Rivers, York River Basin)
- Michael Ward, Henry County Treatment Division, Public Service Authority  
(Smith River in Roanoke River Basin)
- Karen Canody, Roanoke Steel (Peters Creek in Roanoke River Basin)

**Summary Listing of Commenters on the Draft 2002 303(d) Report**

| <b>No.</b> | <b>Name</b>                     | <b>Affiliation</b>   |
|------------|---------------------------------|--|
| 1          | Thomas Henry                    | U.S. EPA   |
| 2          | Paul J. Lancaster               | Blacksburg Planning Commissioner                             |
| 3          | Ram Gupta                       | CBLAD  |
| 4          | Eulane B. Hamm                  | The Clinch Coalition   |
| 5          | Joan Hammond                    |  |
| 6          | Norm E. LeBlanc                 | Hampton Roads Sanitation District                            |
| 7          | Frank W. Harsen, Jr.            | Hanover County   |
| 8          | Michael Ward                    | Henry County Treatment Division,<br>Public Service Authority |
| 9          | Patricia A. Jackson             | James River Association                                      |
| 10         | Carl H. Groth                   | Lake Anna Civic Association                                  |
| 11         | Darrell Schwalm                 | Loudoun Watershed Watch                                      |
| 12         | James M. Stuhltrager            | Mid Atlantic Environmental Law Center                        |
| 13         | Michael T. Markley              | Lynrose Angus  |
| 14         | John H. Dyches                  | City of Martinsville   |
| 15         | Christopher D. Pomeroy          | VAMWA (McGuire Woods)  |
| 16         | G. Mark Gibb                    | Northern Virginia Regional Commission                        |
| 17         | James L. Bannwart               | Upper Occoquan Sewage Authority (UOSA)                       |
| 18         | Karen Canody                    | Roanoke Electric Steel ("RES")                               |
| 19         | Martin S. Lowney                | USDA   |
| 20         | Mindy Tervo                     |  |
| 21         | Brett A. Vassey                 | Virginia Manufacturers Association                           |
| 22         | Caryl Burtner                   |  |
| 23         | Thomas J. Grizzard, P.E., Ph.D. | Lab, Virginia Polytechnic Institute &                        |
| 24         | Thomas P. Bonacquisti           | Fairfax County Water Authority                               |

Carol Ann G. Davis  
3WP10  
TMDL Program  
US EPA Region III  
1650 Arch Street  
Philadelphia, Pa 19130

**RE: PUBLIC COMMENTS**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029**

Mr. Alan E. Pollock  
Office of Water Quality Programs  
Commonwealth of Virginia  
Department of Environmental Quality  
P.O. Box 10009  
Richmond, VA 23240

Dear Mr. Pollock:

We appreciate the opportunity to review your draft 2002 Section 303(d) Report of Impaired Waters and recognize the significant effort by the Commonwealth of Virginia, Department of Environmental Quality (Commonwealth) in developing this list. The Environmental Protection Agency (EPA) staff from the Water Protection Division and Environmental Services Divisions reviewed the draft list and supporting information. Based on our review for consistency with Regional and National listing guidance, the Total Maximum Daily Load (TMDL) Consent Decree requirements and the previous Section 303(d) lists prepared by the Commonwealth, we are providing comments on the draft 2002 Section 303(d) Report of Impaired Waters.

It is EPA's understanding that the Commonwealth shall proceed with several tasks and submit amended and additional materials later this month for EPA's review prior to our final submission in late September (see Enclosure). In addition, two specific issues have come to EPA's attention late in the public comment period regarding the use of data in the Commonwealth's Section 303(d) list. The Commonwealth has expressed concerns about regional consistency in the use of data in the Section 303(d) list, and EPA shares this concern. Therefore, EPA will need more time to review the following two issues to try to ensure regional consistency in our Section 303(d) list.

First, EPA is concerned with the change made on Page 32 of the July 15, 2002 version of the Water Quality Assessment Guidance Manual. It states "For random probabilistic station segments, the data will be assessed the same way as the fixed station segments but due to the lack of statistical confidence, only the first two assessment categories above will be used." This change in the Commonwealth's guidance regarding the use of the probabilistic data set on its estuarine waters results in these segments not being listed. It is our understanding that the data set goes back to 1992 and will continue in the future. EPA is looking at how this

data can and should be used in the preparation of the Commonwealth's Section 303(d) List and consistency with the other states Region III.

Second, EPA is reviewing how the Commonwealth determines a water is moderately impaired, and therefore, is placed on Part 1A of the Report of Impaired Waters. EPA needs to compare the Commonwealth reasoning of before listing moderately impaired water, a follow-up or a confirmation sample is required prior to listing. EPA believes that this may be inconsistent with our Regional policy and the use of moderately impaired data in other states in our Region. As we continue to review the lists and supporting documentation, additional comments may be provided.

Again, EPA appreciates the opportunity to review the preliminary 2002 Section 303(d) list of impaired waters. If you would like to discuss any of the our comments please contact Ms. Carol Ann Davis at (215) 814-5738.

Sincerely,

Thomas Henry  
TMDL Program Manager

Enclosure

cc: Charles Martin, VADEQ  
Darryl Glover, VADEQ

**Response:** Through a conference call between VADEQ and Carol Ann Davis (EPA Region III) on September 20, 2002, it was agreed that Virginia should work with Maryland to develop a joint process of using random probabilistic benthic data for 303(d) listing decisions. Maryland also did not use this type of data for its 2002 303(d) list. Virginia is committed to submitting a progress report on this issue to EPA no later than April 1, 2003, and to use random probabilistic benthic data for the next 303(d) list.

Also through the conference call on September 20<sup>th</sup>, VADEQ reached an understanding with EPA Region III about the conditions necessary to delist a segment which was previously on the 303(d) List for a benthics impairment. In the future, a segment that previously assessed as severely or moderately impaired for benthics will remain on the Impaired Waters List until it assesses as not impaired for a subsequent (normally five-year) assessment period. As a result, VADEQ has added several such segments to the 2002 Impaired Waters List.

Commenter: Joan Hammond

**COMMENT(S) AND RESPONSE(S):**

1. Concern about Elk Creek

**Response:** (via letter from DEQ Southwest Regional Office)

Dear Ms. Hammond:

I appreciate your comments concerning the Galax Gazette article about the impairment of Elk Creek. Like you, I want to see our dwindling tax dollars spent in a way that gives us the greatest value.

The Elk Creek TMDL study does not have to wait until 2014. We at DEQ welcome the participation of citizens and groups to help delineate the affected areas, locate the specific causes and sources of pollutants, and restore the waters. In many cases, public and private partnerships are able to address problems and find solutions at the community level.

If you are interested in becoming an active participant, you may contact me and I will provide a list of groups that are already working to solve water pollution problems in the New River Basin. The New River Watershed Conservation Roundtable, the Friends of Claytor Lake, <http://www.focl.org/>, National Committee for the New River, <http://www.ncnr.org/>, and American Heritage Rivers, [pwoodie@skybest.com](mailto:pwoodie@skybest.com) or [benb@lrh.usace.army.mil](mailto:benb@lrh.usace.army.mil), are groups already working in your area. The New River Watershed Conservation Roundtable and the Friends of Claytor lake are examples of citizen organized groups assisted by agencies that are formulating work plans and obtaining grant money for projects on the river. I have taken the liberty to add your name to the email list for the New River Roundtable. Charlotte Burnett, Department of Conservation and Recreation New River Watershed Manager, [cburnett@dcr.state.va.us](mailto:cburnett@dcr.state.va.us), is the agency contact for the group and will be sending you the committee e-mail. I encourage you to contact Ms. Burnett and attend a meeting of the Roundtable to get a sense of the [group's activities](#). The [meetings](#) are usually held in Dublin.

If you have additional questions, please feel free to contact me at (276) 676-4805 or via email at [tfrazier@deq.state.us](mailto:tfrazier@deq.state.us).

Sincerely,

Teresa Frazier  
VDEQ-SWRO  
PO Box 1688, Abingdon, VA 24212  
voice: 276.676.4805  
fax: 276.676.4899

**COMMENT(S) AND RESPONSE(S):**

1. We are very concerned by what we believe is an erroneous listing of the saline portion of the James River (specifically):
  - a) James River Basin, mainstem, VAT-G10E-04, Listed for Nutrients, Part 1A
  - b) James River Basin; Southern Branch, Eastern Branch and mainstem of Elizabeth River; VAT-G15E; Listed for TBT, Part 1A
  - c) James River Basin, Elizabeth River & All Branches (mainstems), VAT-G15E, Listed for Nutrients, Part 1A
  - d) York River Basin, Upper & Lower York mainstem, VAT-F26E-01, Listed for Nutrients, Part 1A

**Response:** After reviewing the specific comments submitted in regards to the segments listed above, VADEQ has added “turbidity” as an impairment cause for each of them. Low Dissolved Oxygen has been added as an impairment cause for the Elizabeth River. This has been done based on best professional judgement and is substantiated by the latest tributary strategies and Chesapeake Bay Program models.

2. Part 1B presents shellfish water segments listed as impaired based on VDH/DSS decisions that bacterial TMDLs are warranted for these segments.

**Response:** VADEQ and the Virginia Department of Health, Bureau of Shellfish Sanitation, work closely together on shellfish listings, and the emerging development of shellfish TMDLs. VADEQ depends upon the expertise, and recognizes the authority of VDH, which maintains the official list of shellfish closure areas in the state. We have proposed however, in the 2002 303(d) Report, working with VDH, to delist selected administrative shellfish closure areas.

**COMMENT(S) AND RESPONSE(S):**

Hanover County appreciates the opportunity to comment on the recently released draft report ‘2002 303(d) Report on Impaired Waters’ issued by the Department of Environmental Quality.

Hanover County Department of Public Utilities (DPU) currently operates three wastewater treatment plants all of which discharge into the York River watershed. While it appears that our plants have little impact on the drainage, a section of the South Anna River (VAP-F04R) is cited as being impaired by zinc in Part 2 of the list. The source of the zinc is listed as “Municipal;” thus, I am assuming the municipal source is in reference to our Ashland WWTP permit (VA0024899) issued June 14, 1999. Accordingly, the current VPDES permit includes provisions to establish a limit for zinc which may have been the trigger for the listing. Please be advised that the AWWTP permit (VA0024899) is currently being modified to have the limit for zinc REMOVED. The justification for this modification is based on the fact that Hanover County DPU demonstrated that the AWWTP does not discharge enough zinc to warrant a VPDES limit. We ask that you consider removing section VAP-F04R (South Anna River – Unnamed tributary to the North) from Part 2 of the 303(d) Impaired Waters list if in fact, the listing is based on the Ashland WWTP VPDES permit. If the listing is not based on this fact we would request that the source of the impairment be listed as unknown or more clearly identified so that the Ashland Wastewater Treatment Plant is not implicated.

We would also like to comment on the listing of the tidal Pamunkey River for low dissolved oxygen. Hanover County completed in-stream monitoring of the Pamunkey River as part of its feasibility study for siting a new wastewater treatment plant from June 1, 1995 to October 31, 1995 from RM 56.87 (Route 360) to RM 40.74 (Montague Landing). Based on this study our consultant concluded that this segment of the Pamunkey River “experiences periods in which surface water quality is below Water Quality Standards due to low dissolved oxygen levels. These violations appear to occur only at the lower stream flows that occur in summer months. The dissolved oxygen level appears to be directly dependent upon tidal influence with the low D.O. condition or sag point moving upstream at high tide and downstream at low tide. The conditions appear to be more severe at the downstream monitoring points over the section of the river that was monitored. The water quality problems are likely due to the low velocities associated with the high tide condition. There may also be an effect from organics in the low-lying swampy reaches being backed up the river.” The results of this study imply that the low dissolved oxygen conditions that this reach of the river experiences are due to naturally occurring conditions. We question the listing of a water body that does not meet water quality standards due to naturally occurring conditions and would like to see consideration given to removing such waters from the listing or placing them on a special listing as was proposed by the DEQ, but previously rejected by the U.S. EPA.

**Response:** The South Anna River in the mixing zone of the Ashland Municipal STP (VA0024899) is listed on Part II of the 2002 Impaired Waters list for zinc. Part II contains those waters for which a Virginia Pollutant Discharge Elimination System (VPDES) permit has been issued that contains permit limits that are not currently being attained. It is assumed that if water quality based limits are not being met, then the instream water quality standards are subsequently being violated. For the 2002 listing, any permitted discharge that had a compliance schedule that extended past April 1, 2002 is being listed. The Ashland Municipal STP has a compliance schedule for zinc that requires compliance with the June 14, 1999 permit limit by June 14, 2003. Although Mr. Harksen is correct that the DEQ is currently processing a permit modification request to remove the zinc limit based on new sampling results, this action is not expected to be completed until late November 2002, well after both the April 1, 2002 cutoff for the Part II list

and the October 1, 2002 submittal date to EPA. Therefore the South Anna River is correctly listed this cycle. If this modification is completed, the segment will be delisted during the next 303(d) cycle.

The tidal Pamunkey River was initially listed by DEQ on the 1998 303(d) list as only fully supporting but threatened of the Aquatic Life Use goal because the 1995 special study performed for Hanover County showed that the river was subject to a 33% violation rate of the daily mean dissolved oxygen standard during warm weather conditions. In addition, the estuarine Pamunkey River is considered fully allocated relative to dissolved oxygen and new discharges cannot result in further DO depression. Subsequent to DEQ's 1998 submittal, EPA added the Chesapeake Bay and its tidal tributaries to the 303(d) list, stating that there are violations of the dissolved oxygen standard caused by nutrient over enrichment. This listing included the entire mainstem estuarine Pamunkey River. Due to EPA's decision, DEQ is required to list the tidal Pamunkey River on Part 1A as impaired of the Aquatic Life Use during the 2002 cycle, although DEQ recognizes that both the dissolved oxygen and chlorophyll A sampling were acceptable. [The dissolved oxygen violation rate was 1/59 at 8-PMK048.80, 12/168 at 8-PMK006.36, and 10/172 at 8-PMK034.17. No chlorophyll A violations were recorded.]



Commenter: Michael Ward,  
Henry County Treatment Division Public Service Authority

**COMMENT(S) AND RESPONSE(S):**

1. Benthic data considered is for the period ending in 2000 and is obsolete. Tultex and Vanity Fair (major textile industries) closed plants in 11/99 and 3/02, respectively, thereby reducing industrial discharges to this segment by over 5.0 MGD. Chloride levels, which were thought to have an impact on the benthic community, have been drastically reduced.

**Response:** It is the goal of DEQ to make assessments based on data that has been collected within the reporting data window. However, there are times where this may not be met due to monitoring scheduling or other priorities such as "rotating basin" monitoring. Decisions to use data outside of the assessment window are made based on professional judgement of the assessment staff on a case by case basis.

DEQ assessment staff are aware of the recent changes in the Martinsville / Henry County area and plans to pump the former Henry County waste stream to the Martinsville City facility. More recent Rapid Bioassessment Protocols (RBP II in Barbour et al. 1999; see <http://www.epa.gov/owow/monitoring/rbp/>) remain moderately impaired based on best professional judgement. Below is the body of a written communication from the West Central Regional Biologist, Mr. George Devlin, to Mr. Andy Lash, City of Martinsville on August 29, 2002. The additional data files are available upon request.

Dear Mr. Lash:

In response to your request for biological monitoring data for the Smith River, I have enclosed copies of field sheets and data summaries in spreadsheet format from our fall 2001 sampling period. We surveyed four stations from Fieldale (rivermile 33.10) to the Route 636 bridge (rivermile 15.43).

The spreadsheet with the header **Fall 2001 Assessments** shows that I assessed station **4ASRE022.30** as *Moderately Impaired* using Best Professional Judgement. When assessed purely using the metrics in EPA's Rapid Bioassessment Protocols (RBPII in Barbour et al. 1999), this station is rated as *Slightly Impaired* because it receives some high scores on individual metrics regarding the functional feeding groups of the sampled community. However, when looking at the metrics that relate to the pollution tolerance of the whole community, it is evident that tolerant organisms dominate this reach of the river when compare to the control site and the downstream recovery site (4ASRE015.43). Six different metrics in the spreadsheet show a clear deviation between 4ASRE022.30 and the control site. Four major metrics are:

- 1) *EPT Taxa* decreases from eight to four,
- 2) *%Chironomidae* (pollution tolerant) increases from 3.3% to 49.0%,
- 3) *%Ephemeroptera* (Mayflies, pollution intolerant) decreases from 48.3% to 9.0%,
- 4) *%Intolerant individuals* (includes all organisms in sample, not just most tolerant, or most intolerant) decreases from 75.8% to 30.0%.

The recovery of the macroinvertebrate community at 4ASRE015.43 proves that the upstream changes are not a result of a natural decline in the tolerance of the community.

Another point to make is that the habitat scores for the control station (72.5%) are lower than those at the impaired sites (83.0 and 87.5). Good stream habitat should result in a good benthic community. I realize that several recent improvements have been made in the quality of the STP discharge. If these improvements persist, one would expect to see an improvement in the benthic community over time.

I have included an additional station (4ASRV012.19) in the assessments spreadsheet for the purpose of comparing a relatively undisturbed site to the Smith River. This is the Sandy River in Pittsylvania County and is a potential Piedmont Ecoregion reference site.

2. The only station in this segment observed in 2000 (prior observation was 1998) is located where cattle regularly walk into the river, causing obvious physical damage and local pollution.

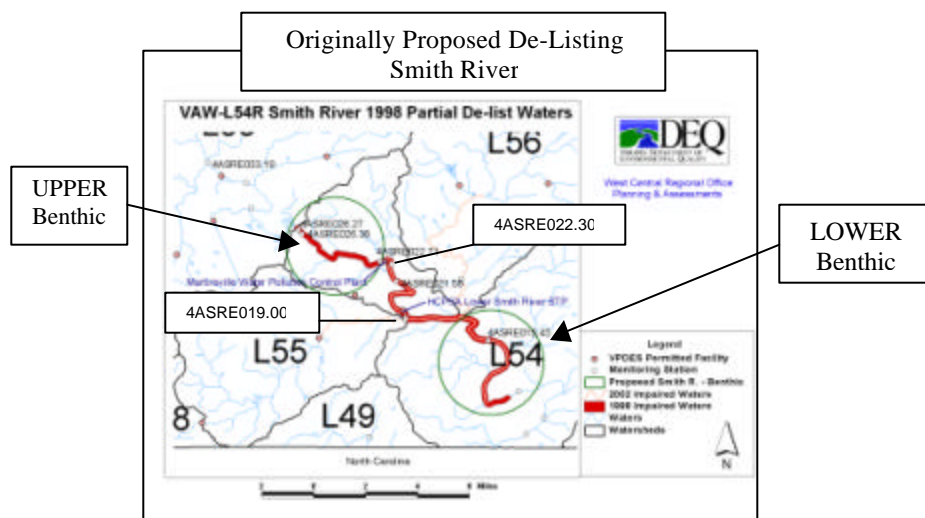
**Response:** Great care is taken in the siting and collection of biological data. The intent of the DEQ ambient and biological monitoring programs is to site stations representative of local conditions of the stream sampled. Biological collections are made only in stable substrates. DEQ staff is acutely aware of station location and extreme conditions not normally found.

3. The Martinsville STP permit will expire 2/20/04, before the next 303(d) list will be completed. The current impaired status will have a negative impact on the City's reissued permit throughout the next five-year permit period.

**Response:** The re-issuance of the Martinsville STP permit in 2004 will most likely contain at this writing a special condition for a TMDL Re-opener. This language allows for the development of a Total Maximum Daily Load (TMDL) Allocation Scenario for the specific parameter(s) of concern. Any modification of the VPDES permit would occur only after the development of a TMDL for the specific parameter(s) of concern.

Please note that the Smith River segment is not scheduled for TMDL development until after 2004 but before 2010. Changed conditions, as you have noted and recognized by the latest 2002 Assessment may result in a more favorable assessment at a later date with subsequent removal from the impaired waters list. De-listing can only occur with sustained improvement in the biological community. Should sufficient RBP II surveys demonstrate improved conditions prior to 2004 a de-listing of the Smith River for the General Standard – Benthic impairment may be pursued.

4. We have asked to be kept informed regarding river assessments for this segment, but have heard nothing for the past several years. Presumably, at least some stations were observed in 2001 and spring of 2002. Recent efforts to obtain this data have not been successful.



**Response:** Please reference item 1 above. As noted previously changed conditions in the Smith River are documented in the 2002 305(b) Assessment and 303(d) Impaired Waters Reports. Biological responses to changed conditions occur over long periods of time. Generally speaking the biological community response is reflective of approximately a six month condition. Both aforementioned documents note favorable (full support) conditions are anticipated and will be reported to you when results are available.

Based on conversations with the EPA, they will not accept the most recent consecutive RBP II surveys utilized in the 2002 cycle (1996-2000) Assessment for the 2002 Impaired Waters De-listing at this time. DEQ has assessed for 2002 an upper (3.59 mile) and lower (5.61 mile) portion of the original Smith River 1998 segment as 'fully supporting' as depicted above and will not change this designation in the 2002 assessment database. However the database will note de-listing can not be pursued due to insufficient positive (a minimum of two consecutive) RBP II survey results.

Positive assessments are 'slight' or 'no impairment' from RBP II survey data. The 2002 303(d) Impaired Waters Listing will be changed to document the continuation of the original 1998 Impaired Waters listing of 13.77 miles. The 2002 303(d) Fact Sheet will also note as described above anticipated improved conditions but DEQ must continue the entire 1998 listed segment. Once sufficient RBP II survey data provides 'no impairment' results DEQ will actively pursue de-listing of the upper and lower segments.

**COMMENT(S) AND RESPONSE(S):**

**Note: Those comments concerning the assessment reports are addressed below**

6. We are concerned about the inadequate use of the anti-degradation narrative standard in determining whether water quality has been degraded. There is no mention of the lack of designated Tier III waters or how Tier II waters are being addressed.

**Response:** There are currently ten candidates for Tier III waters. If approved, the total number of Tier III waters in Virginia would increase to 11. Tier II and Tier III waters are protected through discharge permit limits under the existing Anti-Degradation Policy in the Virginia Water Quality Standards. Revisions to that policy are currently being considered under an administrative rule-making.

7. Additionally, there does not seem to be any recognition of the relationship of water quantity and water quality in the 305(b) report. Since we are in the middle of a very severe drought, which is affecting ground water and surface water flows, the impacts on water quality should be acknowledged.

**Response:** Water quantity is not considered a pollutant. However, man-made alterations may not contravene designated uses (9 VAC 25-260-40). For naturally occurring low flow periods, the Water Quality Standards exempt certain water quality criteria during those periods flow (flows less than 7Q10). Those exempt criteria include dissolved oxygen, pH and temperature (9VAC 25-260-50). All other Water Quality Standards are assessed for support of the appropriate designated use(s).

8. The Tidewater Regional Report seems to be missing from Chapter 2.8 of the 305(b) report.

**Response:** Chapter 2.8 was developed to help describe regional/local initiatives concerning water quality. Since it is a new outreach initiative and not required by 305(b) regulations, regional input was optional.

9. The tables in Chapters 3.4 of the 305(b) report should include totals for the miles of rivers, acres of lakes, and square miles of estuaries that are improved.

**Response:** DEQ is working to incorporate water quality trends into the 305(b) assessment process. You will note a discussion of water quality trends in the final section of Chapter 2.1. We hope to expand water quality trend information in future reports to include water quality improvements.

10. In Chapter 3.5 of the 305(b) report, on the Chesapeake Bay Assessment and Program Initiatives, the goals for nutrient and sediment reduction in the Lower Tributaries are not clearly stated. Also, it is not clear that the Bay and its tidal tributaries are impaired, the total costs for nutrient and sediment reductions are not identified, and the lack of Water Quality Improvement Funds in the state budget are not mentioned. This information is essential to assess whether the Bay and its tributaries will achieve compliance by 2010.

**Response: Text to be added to Chap. 3.5 (Tributary Strategy section):**

"Briefly stated, the current strategy goals for Virginia's lower Bay tributaries are:

Rappahannock: reduce volume of anoxic water (D.O. < 1 mg/l) by 50%; increase the density of underwater grasses by 50%; reduce nitrogen load by 33%, phosphorus load by 29%, and sediment load by 20%.

York: reduce volume of anoxic water by 47%; increase density of underwater grasses by 39%; reduce nitrogen load by 30%, phosphorus load by 44%, and sediment load by 18%.

James: focusing on the tidal fresh region below Richmond - increase density and acreage of underwater grasses; reduce algae levels by about 50%; reduce nitrogen load by 32%; phosphorus load by 39%; sediment load by 9%; improve river bottom habitat in non-tidal region through reduced sediment loads.

Eastern Shore: increase the areas and density of underwater grass in tidal creeks and embayments to historic levels; enable the return of abundant and diverse fish and shellfish; targeted actions reduce nitrogen load by 33%, phosphorus load by 43%; sediment load by 30%."

Page 3.5-1 of the 305(b) report states that: "At the same time Bay Program partners were developing the new Bay Agreement, the Chesapeake Bay and many of its tidal tributaries were placed on the "impaired waters" list." (*emphasis added*)

The main purpose of the 305(b) Report is to characterize water quality conditions in Virginia, not to provide details on corrective plans. Information on control actions and cost estimates for their implementation will be included in the revised Tributary Strategies, which are planned for development over the year following establishment of new nutrient and sediment load allocations for the major Bay basins (these are expected in April 2003).

11. In the 303(d) report, we suggest that the term "threatened", rather than "waters of concern" should be used. This is important to the public, particularly because EPA has defined the term "threatened" and it is likely that they will become impaired without some corrective action.

**Response:** DEQ agrees that waters of concern deserve attention. However, we do not necessarily agree that impairment of these waters is imminent. These waters are "flagged" for additional monitoring to assure that water quality conditions do not negatively affect the designated use(s).

12. We do not support the delisting of any impaired streams simply because a TMDL is developed and approved by EPA. It must be implemented and proof of water quality standard compliance must be documented. If this is the intent, it is not clearly stated.

**Response:** The purpose of the 303(d) list is to identify those waters needing a TMDL. Once a TMDL is developed and approved by EPA, it is no longer a part of the 303(d) list. However, state law 62.1-44.19:7 of the Water Quality Monitoring and Information Act (WQMIRA) requires development of a plan for implementation and return of water quality associated with the TMDL allocations. For tracking and informational purposes, we shall show segments that have completed TMDLs in Part 1A of the 2002 Impaired Waters Report. In place of fact sheets, the mapping application on the DEQ website will link to completed TMDL reports where applicable.

**COMMENT(S) AND RESPONSE(S):**

1. We understand that local communities such as ours do not need to wait for the formally scheduled TMDLs to begin addressing the impaired waters. In our case we are working with DCR's Hoyt Wheeland in the York Watershed office to begin mini-watershed management projects for each of the impaired streams, using property owner associations which are on the impaired streams to manage more intensive monitoring and identify potential BMPs or other activities which may alleviate the impairments. We are enlisting the guidance of appropriate Soil & Water Conservation Districts, planning district commissions, and county staff in this effort. Finally we are beginning to network these and other watershed stakeholders into a Watershed Roundtable, as recommended by your Secretary of Natural Resource's Report on Chesapeake Bay 2000. As you know, we already have a superb watershed management plan, the Lake Anna Special Area Plan (LASAP), which was created under Lake Anna Advisory Committee leadership in 2000. Our goal now is to continue working to implement its vision.

**Response:** Active involvement of local stakeholders is critical in developing and implementing measures to improve water quality. The Lake Anna Civic Association (LACA) has taken initiative on many water quality issues associated with the lake watershed, including working with the DEQ, Northern Virginia Regional Office to develop and implement a comprehensive lake water quality monitoring program. DEQ encourages the LACA effort to coordinate the array of agencies and stakeholders involved in watershed management, and supports the partnership with LACA in these water quality-planning initiatives.

2. There is a lot we can do as volunteers to pursue the sources of fecal coliform, but at some point we will need technical support in the form of bacterial source tracking. We would appreciate advice and guidance on how to proceed once we have pursued any fecal coliform impairments to their source location.

**Response:** The DEQ, Northern Virginia Regional Office and Central Office will be able to provide technical assistance to LACA on determining sources of fecal coliform bacteria, including bacteria source tracking.

3. The surprising news to us from the 2002 Report on Impaired Waters was the presence of unacceptably high levels of PCBs and metals in the Lake. We need guidance and material assistance with tracking the PCBs to their sources, and with addressing the acid runoff from Contrary Creek. We established a Contrary Creek task force last year, and are working with Allan Bishop of the Commonwealth's Department of Mines, Minerals and Energy to define the tasks needed to restore that creek to an acceptable state. We would appreciate initiation of a DEQ-sponsored assessment of the source of PCBs in the mouths of Goldmine Creek and Contrary Creek.

**Response:** The DEQ is interested in investigating the extent and possible source(s) of PCB's in Lake Anna. The agency is currently evaluating the options for conducting a toxic source assessment in light of the increasing demands on limited resources. As we move forward to plan a study of the PCB's in Lake Anna, the DEQ, Northern Virginia Regional Office will coordinate with the LACA. In addition to a toxic contaminant source assessment, the DEQ fish tissue monitoring program will plan on sampling fish from Lake Anna as part of the next round of sampling in the York River Basin. This should be in 2003 or 2004, depending on availability of funding.

4. LACA has an Environmental Education Program (LEEP) which has recently created a web site aimed at bringing environmental information to the attention of the watershed community. Could DEQ and DCR's education coordinators team with our LEEP to bring informative briefs of impairment topics to our web viewers? We have only a volunteer webmaster who could use applications packaged by the Commonwealth's webmastering resources. We also could use assistance in obtaining education resources for informing our watershed's school population about our impairments and their mitigation.

**Response:** Both DCR and DEQ regularly publish and disseminate information on a variety of topics that could be linked to the LEEP website or distributed to residents and school children. LACA can contact education coordinators Ann Regn at DEQ ([amregn@deq.state.va.us](mailto:amregn@deq.state.va.us); 804-698-4442) and Dawn Shank at DCR ([dshank@dcr.state.va.us](mailto:dshank@dcr.state.va.us); 804-692-0903) for more information. Ann works closely with the Virginia Department of Education to develop educational resources

that meet the state's academic standards while addressing environmental concerns. Educational resources that you can use or access can be easily found through Virginia Naturally, the statewide environmental education network at [www.vanaturally.com](http://www.vanaturally.com). The LACA can become a Virginia Naturally "partner" <<http://www.vanaturally.com/about.html>> and advertise its programs such as LEEP

program to schools as well as receive information about grant and partnership opportunities. DEQ is working closely with the Chesapeake Bay Foundation to implement an environmental education program in schools. Six schools in Louisa County have signed up to be Bay Schools (four elementary schools, 1 middle and 1 HS) and will receive special training and pertinent resources to teach about watersheds, nonpoint source pollution and other related topics. The LEEP program could be a good complement to that effort.

5. Finally, we would appreciate a follow up assessment to your report on our impaired waters which would outline suggested strategies for us to follow in concert with the natural resource agencies. We have a fair idea of the impairments, thanks to your reports and the superb briefing for our watershed community. Now we need to get your best advice about how to begin mitigating these problems. We hope that DEQ's portion of our joint monitoring program can be expanded to focus on our impaired waters and facilitate answers to the issues mentioned above. We hope that your support will allow us to participate in that expanded effort.

**Response:** DEQ considers the LACA an active partner in the water quality monitoring, planning, and improvement efforts throughout the Lake Anna watershed. We will actively seek the input and participation of the LACA on water quality projects in the drainage. With respect to how to begin mitigation efforts, the planning actions highlighted in the LACA Comment #1 above are a good beginning. Coordinating the many agencies and stakeholders involved in water quality planning efforts is key to successful plan development and implementation. In addition, please be aware that the Total Maximum Daily Load (TMDL) program in Virginia will address the stream impairments noted in the watershed. Development of a TMDL will entail the following for each stream impairment: (1) Identify all sources of a given pollutant within the watershed; (2) Calculate the amount of pollutant entering the stream from each source; (3) Calculate the pollutant reductions needed, by source, to attain water quality standards; (4) Allocate the allowable loading to each source and include a margin of safety.

**COMMENT(S) AND RESPONSE(S):**

1. **USE OF NON-DEQ “MONITORED” DATA** – DEQ is to be commended for their efforts to improve the protocol and criteria for accepting non-DEQ data for use in the 305 (b) assessment as explained on page 3.2 –1-2 of the (b) report. It is noted that this protocol includes a provision that as the assessment staff becomes aware of data sources, they are to work with the data generating party to get the data approved for use by DEQ.

However, it is our experience that additional resources are needed to implement this policy. An example is provided by data collected by the Loudoun County Sanitation Authority (LCSA). This local government agency has been collecting water quality data at a station on Broad Run near Rt. 7 since the early 1990's. The data are to satisfy state requirements (DEQ's?) for the future siting of a STP. The data are collected under contract and samples are analyzed at a competent lab. DEQ is aware of these data, and have received copies of the data in the context of comments submitted to DEQ in 2001 by LWW regarding the classification of Broad Run as fully supporting. Yet the data is not including in the 305 assessment because LCSA has not been approached by DEQ to submit it for this purpose.

**Response:** DEQ considered all QA/QC approved monitoring data submitted prior to the beginning of the assessment. Data generators were responsible for contacting the DEQ Water Quality Monitoring and Assessment Program (WQMAP) for data considerations and QA/QC protocol reviews. Should the Loudoun County Sanitation Authority (LCSA) seek to have their data included in the 2004 water quality assessment, they should contact DEQ prior to the assessment to understand the required QA/QC protocol review. Please note that the water quality monitoring data collected by LCSA has not been collected at the request, or requirement, of DEQ.

2. **DATA ANALYSIS PERIOD** – Page 3.2-1 indicates that in 1998 DEQ changed the data analysis period from two to five years. The assessment period is from January 1, 1996 through December 31, 2000 for this 2002, 305(d) assessment. In July 2001 DEQ also changed their schedule for sampling streams switching from an annual sampling of each station to a six-year rotation schedule. Stream stations will be sampled for two of the six years and not sampled for four. As a result there will be data collected at sampling stations between January 1 and June 30, 2001 that are not being used in the 2002, 305 (b)/(d) assessment that will languish in the files until the 2004, 305 assessment even though no additional data will be collected at the station until July 2005. This problem will continue for each assessment report since the assessment period will preclude using 6 months of sampling data from each of your two-year cycle stations. It seems more responsible for the 305 assessment period to coincide with DEQ's sampling schedule by designating a July 1996 to June 2001 assessment period. This puts DEQ's assessment period in sync with the fiscal year based sampling schedule and cycle.

**Response:** The assessment period for the 2002 305(b) water quality assessment is the five-year period extending from January 1, 1996, through December 31, 2000. DEQ has considered the implications of the recent changes to the water quality monitoring strategy for the water quality assessment. We will take your comment into consideration for planning the next, and/or subsequent, water quality assessments.



3. **BROAD RUN** -- The January 1996 - December 2000 data collected by DEQ show that fecal levels meet state standards. Only 5% of the samples are above 1000 fecal coliform. The trend line for these data, when plotted over time, suggest that fecal coliform levels are gradually decreasing. However, there are periods when fecal coliform levels exceed 3000 mFC/100ml.

**Loudoun County Sanitation Authority Data** – LCSA has collected fecal coliform data on Broad Run since 1990 at a site a short distance upstream from the DEQ site. The data are collected under contract with the Occoquan Watershed Monitoring Laboratory operated by the Virginia Tech Department of Civil Engineering. The data are a component of the Dulles Area Watershed Policy adopted by DEQ. A copy of the monitoring program work plan for FY 2003 is being sent by mail as part of these comments.

The LCSA data is provided on an Excel spreadsheet in **Attachment 1** (this is not formatted for printing). The 1996 – 2000 data, plotted as cumulative percentages, is shown in **Figure 2**. Fourteen percent of the samples exceed 1000 indicating that the standard is not being met. These data also show that fecal coliform levels are gradually decreasing and that intermittent spikes of pollution occur. However, the LCSA data reveals more spikes than the DEQ data. The spikes occur on different sampling dates and suggest that the likelihood of missing pollution events increases as the frequency of sampling decreases. When the DEQ and the LCSA data are combined, as shown in **Figure 3**, 19% of the samples exceed the 1000 mFC/100 ml standard.

**Impaired Waters?** – The 305(b) designates Broad Run as non-impaired because the LCSA data is not considered. The LCSA data should be considered and the stream designated as impaired. The fecal contamination is most likely coming from nonpoint sources of pollution such as urban and agricultural runoff, and wildlife.

**Response:** Please refer to the previous response above regarding the use of QA/QC approved data in the water quality assessment. With regard to the fecal coliform exceedences indicated by the water quality monitoring conducted by the Loudoun County Sanitation Authority (LCSA), DEQ plans to establish a trend water quality monitoring station at the Route 7 monitoring site (station ID 1ABRB002.15). Trend stations are to be sampled bi-monthly throughout the six-year rotation cycle included in the DEQ monitoring strategy. The historical monitoring data combined with the recent installation of a flow gage at this location contribute to making this a suitable site for a trend monitoring station. Establishment of a trend station will provide DEQ-generated data for future water quality assessments. If LCSA would like to have their dataset included in the next 305(b) water quality assessment, they should contact DEQ as indicated above in the response to a previous comment.

4. **GOOSE CREEK** - DEQ has collected benthic macroinvertebrate data at Rt. 7 and Goose Creek for several years until June 2000. They calculated eight metrics to compare results with a reference stream and to determine whether a stream is impaired. The comparisons are shown in **Figures 6**. The data include a trendline. The results for the period 1996 – 2000 show that there is only a “fair” similarity, and that the level of similarity has decreased over the sampling period. DEQ reports that there are various point and nonpoint pollution sources affecting the stream, as well as construction activities. There is a reduced number of insect species, particularly insects sensitive to poor water quality and habitat conditions. In 1998 DEQ designated Goose Creek as **moderately impaired** based upon human impacts that are harmful to aquatic life. The moderately impaired status continued in 2000. The 2002 assessment changes that designation to **slightly impaired** which removes the benthic impairment. The last time benthic monitoring was done is in 2000.

DEQ’s regional biologist explained that the designation was changed from moderate to slight because of a reexamination of the data and a judgment call. He advised:

The Goose Cr., Rt. 7 benthic macro population is heavily influenced by Tuscarora Creek (a non-impaired tributary). This is not a good station for evaluating the lower portion of Goose Creek because of the proximity/influence of Tuscarora. For that reason, we dropped this station a couple of years ago. In 1979, when I started at the Va. State Water Control Board this station was one of our four EPA core monitoring stations. Apparently, we had four stations selected by EPA that we were required to monitor over the long term. That is the primary reason why this station has been sampled for so many years.

The evaluation of the benthic macroinvertebrate populations over the years shows this station to have a level of impairment. It then becomes a JUDGEMENT CALL as to whether I believe this impairment is slight or moderate. That belief, of course, based on the data collected for the evaluation period and an overall station evaluation/assessment. It is therefore, my opinion, that the lower portion of Goose Creek should be listed as Slightly Impaired for the evaluation period.

If it becomes necessary, then we can select a more appropriate station in lower Goose Creek for the next evaluation period.

It should be noted that Tuscarora Creek is the only major tributary in the watershed that is not impaired, and as such should be benefiting the insect community downstream from its confluence and not degrading it. Nevertheless, siting monitoring stations downstream from various degrading inputs is an important criterion in establishing trend stations. The Regional Office is under great stress to accomplish their planned sampling because of reduced staffing and added responsibilities associated with TMDL and other special studies. Changing the designation of the benthic impairment from moderate to slight means that the impairment does not need to be included in the TMDL study and not sampled for benthics by DEQ. Regrettably, the data does not appear to support this change.

Comparison – The other “slightly impaired” biological monitoring site in Loudoun County is on Little River at Rt. 50. An analysis of these data based upon similarity with the reference site is provided in **Figure 7**. The data include a trend line. A comparison of these data with the Goose Creek data in **Figure 6** shows a substantial difference in the scores with Goose Creek scoring considerably lower. Yet both are being designated as “slightly impaired.” This suggests that the range of scores that fall into the “slightly impaired” category is too large, and that the 1998 assessment of Goose Creek benthics as being “moderately impaired” should remain. There are no moderately impaired stations in Loudoun with which to compare the data. With this change, there are no benthic impairments in Loudoun County.

Consequence – The consequence of this change to non-impaired status is substantial. The benthic TMDL for Goose Creek has been put on hold by DEQ pending the 305 (d) determination, and, with this change, will not be conducted. Without the TMDL study, we will not know the extent and source of the impairment, nor will there be a plan to restore aquatic life conditions to an acceptable level. Reinterpreting old data to remove an impairment also sends the wrong message to citizen groups that are focusing their efforts on benthic monitoring and the aquatic life standard. If benthic monitoring is downplayed by DEQ and fecal monitoring is the primary indicator used for TMDLs, citizen data has little “real” meaning. The status of a stream will never exceed the “threatened” level based upon benthic data.

Most Responsible Approach – DEQ is currently conducting a study to change its use of reference sites as a method for assessing benthic data. The benthic impairment on Goose Creek should continue to be designated as “moderate,” and benthics should be included in the TMDL study so the source and extent can be determined. These data should then be analyzed under the new “reference condition” criteria and a determination made on the basis of this empirical data as to the impaired status of Goose Creek. Trained LWW stream monitors would be willing to work under a contract or grant from DEQ to collect benthic data if DEQ has insufficient personnel to conduct the monitoring.

**Response:** DEQ is removing Goose Creek and restoring it to the 2002 impaired waters list. EPA clarified its position on September 20, 2002 regarding delisting of segments previously listed as impaired for benthics. Although assessed as slightly impaired for benthics in the most recent

assessment, because it is already on the impaired waters list for benthics, Goose Creek will remain on the list until a sufficient amount of data demonstrates that it is no longer impaired.

**COMMENT(S) AND RESPONSE(S):**

Despite ALS's general belief that DEQ has improved scope of its section 303(d) List, there are still several areas that require additional explanation, revision or reevaluation. These areas include: (1) the failure to correctly apply the requirements of section 303(d), (2) the failure to identify waters that are "Slightly Impaired" based on a biological survey, and (3) the failure to present data sufficient to justify waters identified for delisting.

1. Failure to Identify All Impaired Water Pursuant to Section 303(d).

Section 303(d) of the CWA requires that each state to "identify those waters within its boundaries for which effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters," and "for which controls on thermal discharges under section 1311 of this title are not stringent enough to assure protection and propagation of indigenous shellfish, fish and wildlife." 33 U.S.C. §1313(d)(1)(A) and (B). In particular, states must identify all impaired waters that do not or may not meet numeric water quality criteria, narrative criteria, water body designated or existing uses or anti-degradation requirements. Ibid.; 40 C.F.R. § 130.7(b)(3) and (5); National Clarifying Guidance for 1998 State and Territorial Section 303(d) Listing Decisions (Aug. 17, 1997) at page 2.

It is unclear whether Virginia's 2002 section 303(d) List complies with the requirements of section 303(d). For example, Virginia does not identify whether it considers anti-degradation requirements – and a waters failure to maintain those standards – when it makes listing decisions. In addition, the CWA requires Virginia to identify all waters that are not expected to meet standards after the imposition of technology-based controls. Even if a water segment does not meet standards due to "natural" conditions, Virginia has no choice but to identify that segment on its section 303(d) List. The only appropriate method to account for "natural" conditions is for Virginia to change the segment's WQSs through a Use Attainability Analysis.

**Response:** The State Water Control Board is currently undergoing a rule making process to revise its Anti-Degradation Policy since the Environmental Protection Agency disapproved limiting the application of the Policy to activities regulated by the State Water Control Board. The revised Policy will be used during the development of the next 303(d) Impaired Waters list. As currently written, application of the Policy is limited to the purview of actions within the authority of the State Water Control Board, such as VPDES, VPA, and VWP permits. DEQ has specifically implemented anti-degradation to protect high quality waters through limits placed in discharge permits. The 2002 Assessment included consideration of the Anti-Degradation Policy for Tier II and Tier III waters through the listing decisions for Part II of the 2002 Impaired Waters List. In addition, the Anti-Degradation Policy was also applied to Tier I waters. All waters in Part I of the 2002 Impaired Waters List failed to meet the water quality standards for Tier I.

2. Failure to Identify Waters that are “Slightly Impaired” Based on a Biological Survey.

Virginia’s 2002 section 303(d) List fails to identify the following eight waters, even though a biological survey revealed that they are “Slightly Impaired”:

|    | Segment  | Stream        | Station     |
|----|----------|---------------|-------------|
| 1. | VAN-A08R | Goose Creek   | 1aGOO002.38 |
| 2. | VAV-B08R | Opequon Creek | 1aOPE034.53 |
| 3. | VAV-B12R | Middle River  | 1BMDL036.10 |
| 4. | VAV-B16R | North River   | 1BNTH046.75 |
| 5. | VAV-B19R | Mossy Creek   | 1BMOS003.01 |
| 6. | VAV-B21R | Dry Run River | 1BDUR000.06 |
| 7. | VAV-B47R | Smith Creek   | 1BSMT005.71 |
| 8. | VAV-B50R | Stony Creek   | 1BSTY004.24 |

ALS believes that because these waters are “Slightly Impaired,” Virginia should identify these waters as “Fully Supporting But Threatened.” During the next listing cycle, Virginia can perform additional monitoring of these waters. If subsequent monitoring demonstrates that these waters are not impaired, they then can be classified as “Fully Supporting.”

**Response:** The DEQ assessment guidance manual clearly states that “Slightly Impaired Waters” are Fully Supporting of the Aquatic Life Use. In addition, recent discussions with EPA on this issue clarified how a “Slightly Impaired” biological assessment will be used. An assessment of slightly impaired has no affect on the listing, or delisting, of any segment. A slightly impaired assessment cannot qualify a segment found moderately or severely impaired in previous assessments for delisting. Similarly, a segment found not impaired or repeatedly found slightly impaired in prior assessments, is not considered impaired and not put on the Impaired Waters List. This practice recognizes that benthic communities can change significantly, but also recover quickly, when affected by short-term events whether due to biological factors or changes in water quality.

As a result, Goose Creek, which assessed as slightly impaired for 2002, will remain on the Impaired Waters List because it assessed as impaired for benthics in 1998. The remaining segments you identified, will be considered fully supporting, slightly impaired:

2. VAV-B08R Opequon Creek 1AOPE034.53 – Was Fully Supporting of the Aquatic Life Use in 1998 & 2000 based upon Slightly Impaired benthic ratings.
3. VAV-B12R Middle River 1BMDL036.10 - Was Fully Supporting of the Aquatic Life Use in 1998 & 2000 based upon Slightly Impaired benthic ratings.
4. VAV-B16R North River 1BNTH046.75 - Was Fully Supporting of the Aquatic Life Use in 1998 & 2000 based upon Slightly Impaired benthic ratings.
5. VAV-B19R Mossy Creek 1BMSS003.01 - Was Fully Supporting of the Aquatic Life Use in 1998, 2000 & 2002 based upon Slightly Impaired benthic ratings.
6. VAV-B21R Dry River 1BDUR000.06 - Was Fully Supporting of the Aquatic Life Use in 1998, 2000 & 2002 based upon Slightly Impaired benthic ratings.
7. VAV-B47R Smith Creek 1BSMT005.71 - Was Fully Supporting of the Aquatic Life Use in 1998, 2000 & 2002 based upon Slightly Impaired benthic ratings.

8. VAV-B49R Stony Creek 1BSTY004.24 - Was Fully Supporting of the Aquatic Life Use in 1998, 2000 & 2002 based upon Slightly Impaired benthic ratings.

3. Failure to Present Data Sufficient to Justify Waters Identified for Delisting.

The 2002 section 303(d) List proposes a number of waters to be “delisted.” However, Virginia has failed to provide any data or information to demonstrate that the waters meet WQSs and would thus be appropriate candidates for delisting. Of special concern to ALS are the proposed delisting of portions of the Chesapeake Bay, the delisting of impaired shellfish waters, and the proposed delisting of Category 2 (point source) waters.

For the Chesapeake Bay, Virginia has presented no evidence to support its decision to delist. Although Virginia has proposed to delist several segments of the Bay which EPA identified as impaired by nutrient enrichment, it has not presented any data to demonstrate that the problem of excess nutrients has been remedied. To the contrary, the most recent data shows that the Bay continues to suffer the effect of excessive nutrients. For example, the Chesapeake Bay Program rates Virginia’s portion of the Bay as fair to poor for both total phosphorous and chlorophyll-a. Therefore, Virginia should not delist the Chesapeake Bay.

For impaired shellfish waters, Virginia presents no data to demonstrate that the waters that it proposes for delisting can actually be used for the harvesting of shellfish. Until Virginia demonstrates that these waters meet that designated use, Virginia should not delist any impaired shellfish waters.

Finally, for the Category 2 (point source) waters, Virginia does not demonstrate that these waters actually meet standards for the associated pollutant. Because most of these waters are listed for ammonia, and because Virginia recently relaxed its ammonia standard, ALS assumes that Virginia proposes these waters for delisting because it expects that these waters will meet the new ammonia criterion. However, for many other Category 2 waters, the explanation is not readily discernible. Therefore, Virginia should identify the data that supports its decision to delist its Category 2 waters.

**Response:** Data to support delistings is submitted to EPA along with the final reports. EPA will review this data and determine its adequacy to support the proposed delistings.

Chesapeake Bay segments were not intended to be delisted in the draft report. These have been restored to the Impaired Waters List in the final report. Shellfish segments have been proposed for delisting based on Virginia Department of Health, Bureau of Shellfish Sanitation. Documentation from VDH is submitted to EPA with the final reports. Proposed delistings from 303(d) Part II are submitted to EPA along with documentation they specifically require for verification. EPA will review this documentation and determine its adequacy.

**COMMENT(S) AND RESPONSE(S):**

- 1 While much credit is due to the use of best management practices (BMPs) to reduce nutrient contributions, the report is woefully lacking in addressing adverse nutrient contributions of biosolids (e.g., in the Rappahannock River Basin). We contend that nutrient management has a mathematical relationship whereby nutrient reduction and nutrient addition constitute an equation with a resultant net value. It is improper to only quantify nutrient reduction particularly when biosolids are applied in close proximity to the rivers (e.g., in the annual flood zones of the Rappahannock and Hazel Rivers) and their tributaries. We request that the report quantify the net contributions of nutrient reductions through BMPs and nutrient additions from biosolids. This analysis should include quantification of the nutrient balance during diverse environmental conditions (e.g., drought, flash flooding, and annual land submersion, etc.). We also request that an overlay map be provided in the reports and for presentation during the public meetings indicating the geographic areas where biosolids have been applied relative to impaired waters. Appendices should be provided in the final reports characterizing the nutrient balance calculations and graphic overlay including those associated with diverse environmental conditions.

**Response:** The contents of the 305(b) Water Quality Assessment and 303(d) Impaired Waters Reports are outlined in federal law. These reports are not intended to evaluate or compare the performance or efficiencies of best management practices.

2. It is unacceptable for the causes of fecal coliform bacteria to be considered unknown, almost uniformly throughout the report. We request that DEQ discuss the basis for not pursuing further characterization of the root causes during public meetings and in the final report. More importantly, we request DEQ to provide a detailed corrective action plan to address these deficiencies.

**Response:** DEQ does not identify the source(s) of water quality impairments without evidence to substantiate a claim. An 'unknown' listing of a contaminant source implies that a study has not yet been performed on the listed waterbody to determine the source(s) of the subject pollutant. Rather than speculate on the probable source(s) of pollutant loading, DEQ will allow the Total Maximum Daily Load (TMDL) to positively identify the sources of pollution and the necessary pollutant reduction from these sources needed in order to achieve compliance with the water quality standards.

3. The reports provide an improper characterization of probabilistic methods related to the monitoring programs. The reports discuss only the aleatory aspects of sample selection. Epistemic aspects of the model are not discussed. There is no apparent attempt to identify sequences, event and fault trees, or cut sets. Likewise, there is no discussion of uncertainty (parameter or model uncertainty) or its quantification in the report's description of the probabilistic approach. Data is available from past monitoring. It would seem reasonable that the report could provide Bayesian updates of the data. The report's use of "probabilistic" terminology is improperly applied in that it does not provide basic probabilistic metrics using frequency and consequence, except to the extent that it serves the apparent purpose of reducing sample frequency, and thus, DEQ resources. The draft reports lack probabilistic technical bases. We request that the report be modified to better utilize the tools of probabilistic risk analysis.

**Response:** The probabilistic monitoring program (ProbMon) is a network of randomly chosen stations used to make statistically based assessments of Virginia's streams. This approach differs from traditional monitoring programs by selecting stations randomly rather than

with biases for access or specific data needs. Data from randomly selected stations represents the true distribution of statewide conditions and allows a measure of the accuracy of these measures. Because the stations are randomly chosen statistical tests can be performed to identify differences between types of streams or regions of the state. This method will provide statistical certainty in water quality assessments and allow better communication of conditions and needs to policy makers.

Water quality programs are required to answer many types of questions. ProbMon is specifically designed to answer many of these questions with statistical certainty. Perhaps the most basic questions are in the form of “what percent of state waters meet a particular water quality standard?” ProbMon will answer this question for every parameter we sample for. A probabilistic design is the most cost-effective way to sample for expensive parameters. While this is one very important reason for this approach the data will also allow a tremendous number of other analyses to be performed that are not possible with site specific sampling techniques such as identification of threatened resources in the state. This knowledge will allow the state policy makers to allocate resources based on knowledge of where the greatest need is.

These are still valid reasons for monitoring fixed stations, however stations chosen with such biases should not be combined for averages of statewide conditions because they are not representative of statewide conditions. Ideally, to answer questions about statewide conditions we would sample every segment of every stream but resources are not available for such intensive sampling. Given limited resources the best way to sample a large population like this is with a statistical probabilistic design.



Commenter: John H. Dyches, Water Resources, City of Martinsville

**COMMENT(S) AND RESPONSE(S):**

1. Benthic data considered is for the period ending in 2000 and is obsolete. Tultex and Vanity Fair (major textile industries) closed plants in 11/99 and 3/02, respectively, thereby reducing industrial discharges to this segment by over 5.0 MGD. Chloride levels, which were thought to have an impact on the benthic community, have been drastically reduced.

**Response:** It is the goal of DEQ to make assessments based on data that has been collected within the reporting data window. However, there are times where this may not be met due to monitoring scheduling or other priorities such as "rotating basin" monitoring. Decisions to use data outside of the assessment window are made based on professional judgement of the assessment staff on a case by case basis.

DEQ assessment staff are aware of the recent changes in the Martinsville / Henry County area and plans to pump the former Henry County waste stream to the Martinsville City facility. More recent Rapid Bioassessment Protocols (RBP II in Barbour et al. 1999; see <http://www.epa.gov/owow/monitoring/rbp/>) remain moderately impaired based on best professional judgement. Below is the body of a written communication from the West Central Regional Biologist, Mr. George Devlin, to Mr. Andy Lash, City of Martinsville on August 29, 2002. The additional data files mentioned in the letter follow.

Dear Mr. Lash:

In response to your request for biological monitoring data for the Smith River, I have enclosed copies of field sheets and data summaries in spreadsheet format from our fall 2001 sampling period. We surveyed four stations from Fieldale (rivermile 33.10) to the Route 636 bridge (rivermile 15.43).

The spreadsheet with the header **Fall 2001 Assessments** shows that I assessed station **4ASRE022.30** as *Moderately Impaired* using Best Professional Judgement. When assessed purely using the metrics in EPA's Rapid Bioassessment Protocols (RBPII in Barbour et al. 1999), this station is rated as *Slightly Impaired* because it receives some high scores on individual metrics regarding the functional feeding groups of the sampled community. However, when looking at the metrics that relate to the pollution tolerance of the whole community, it is evident that tolerant organisms dominate this reach of the river when compare to the control site and the downstream recovery site (4ASRE015.43). Six different metrics in the spreadsheet show a clear deviation between 4ASRE022.30 and the control site. Four major metrics are:

- 1) *EPT Taxa* decreases from eight to four,
- 2) %*Chironomidae* (pollution tolerant) increases from 3.3% to 49.0%,
- 3) %*Ephemeroptera* (Mayflies, pollution intolerant) decreases from 48.3% to 9.0%,
- 4) %*Intolerant individuals* (includes all organisms in sample, not just most tolerant, or most intolerant) decreases from 75.8% to 30.0%.

The recovery of the macroinvertebrate community at 4ASRE015.43 proves that the upstream changes are not a result of a natural decline in the tolerance of the community.

Another point to make is that the habitat scores for the control station (72.5%) are lower than those at the impaired sites (83.0 and 87.5). Good stream habitat should result in a good benthic community. I realize that several recent improvements have been made in the quality of the STP discharge. If these improvements persist, one would expect to see an improvement in the benthic community over time.

I have included an additional station (4ASRV012.19) in the assessments spreadsheet for the purpose of comparing a relatively undisturbed site to the Smith River. This is the Sandy River in Pittsylvania County and is a potential Piedmont Ecoregion reference site.

2. The only station in this segment observed in 2000 (prior observation was 1998) is located where cattle regularly walk into the river, causing obvious physical damage and local pollution.

**Response:** Great care is taken in the siting and collection of biological data. The intent of the DEQ ambient and biological monitoring programs is to site stations representative of local conditions of the stream sampled. Biological collections are made only in stable substrates. DEQ Staff are acutely aware of station location and extreme conditions not normally found.

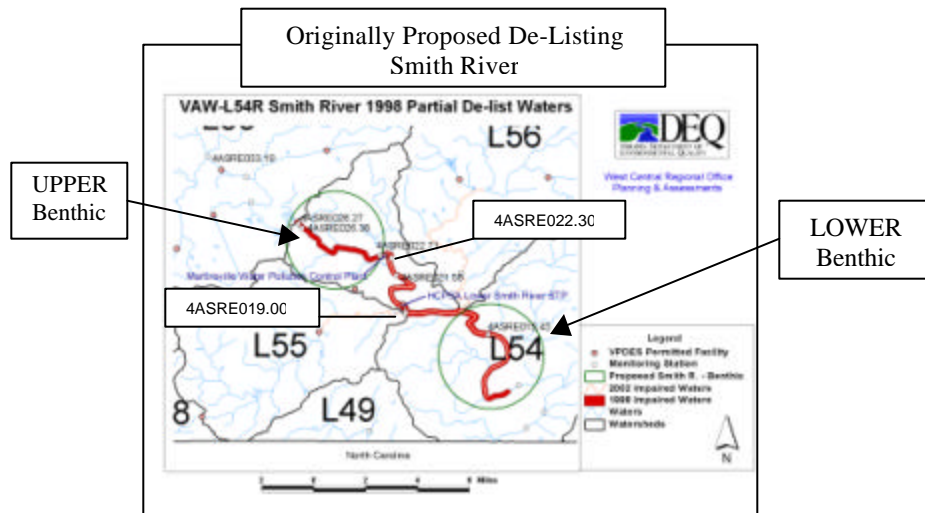
3. The Martinsville STP permit will expire 2/20/04, before the next 303(d) list will be completed. The current impaired status will have a negative impact on the City's reissued permit throughout the next five-year permit period.

**Response:** The re-issuance of the Martinsville STP permit in 2004 will most likely contain at this writing a special condition for a TMDL Reopener. This language allows for the development of a Total Maximum Daily Load (TMDL) Allocation Scenario for the specific parameter(s) of concern. Any modification of the VPDES permit would occur only after the development of a TMDL for the specific parameter(s) of concern.

Please note that the Smith River segment is not scheduled for TMDL development until after 2004 but before 2010. Changed conditions, as you have noted and recognized by the latest 2002 Assessment may result in a more favorable assessment at a later date with subsequent removal from the impaired waters list. De-listing can only occur with sustained improvement in the biological community. Should sufficient RBP II surveys demonstrate improved conditions prior to 2004 a de-listing of the Smith River for the General Standard – Benthic impairment may be pursued.

4. We have asked to be kept informed regarding river assessments for this segment, but have heard nothing for the past several years. Presumably, at least some stations were observed in 2001 and spring of 2002. Recent efforts to obtain this data have not been successful.

**Response:** Please reference item 1 above. As noted previously changed conditions in the Smith River are documented in the 2002 305(b) Assessment and 303(d) Listing documents. Biological responses to changed conditions occur over long periods of time. Generally speaking the biological community response is reflective of approximately a six-month condition. Both aforementioned documents note favorable (full support) conditions are anticipated and will be reported to you when results are available.



Based on conversations with the EPA, they will not accept the most recent consecutive RBP II surveys utilized in the 2002 cycle (1996-2000) Assessment for the 2002 Impaired Waters De-listing at this time. DEQ has assessed for 2002 an upper (3.59 mile) and lower (5.61 mile) portion of the original Smith River 1998 segment as ‘fully supporting’ as depicted above and will not change this designation in the 2002 assessment database. However the database will note de-listing can not be pursued due to insufficient positive (a minimum of two consecutive) RBP II survey results. Positive assessments are ‘slight’ or ‘no impairment’ from RBP II survey data. The 2002 303(d) Impaired Waters Listing will be changed to document the continuation of the original 1998 Impaired Waters Listing of 13.77 miles. The 2002 303(d) Fact Sheet will also note as described above anticipated improved conditions but DEQ must continue the entire 1998 listed segment. Once sufficient RBP II survey data provide two or more consecutive ‘slight’ or ‘no impairment’ results DEQ will actively pursue de-listing of the upper and lower segments.

Should additional RBP II survey data report no ‘impairment’ for the entire 13.77 mile segment DEQ will pursue de-listing of the entire 1998 listed segment.

Commenter: G. Mark Gibb, Northern Virginia Regional Commission

**COMMENT(S) AND RESPONSE(S):**

1. While the Commission prefers that the Reservoir not be placed on the 303(d) list, recent amendments to the State regulations provide specific guidance for how the State standards are to be applied to waters naturally low in DO. Therefore, if the Department proceeds with the listing, the Commission does agree with and supports the conclusion that the suppressed DO levels in the Reservoir hypolimnion are a naturally occurring phenomenon, and that a TMDL does not need to be developed.

**Response:** The DEQ is proceeding with listing the Occoquan Reservoir in the *2002 303(d) Report on Impaired Waters* as impaired due to suppressed dissolved oxygen levels in the reservoir. The source of the low dissolved oxygen is identified as the naturally occurring stratification of the reservoir. While the stratification, and resulting low dissolved oxygen levels, may be a natural process, the DO measurements do not comply with the Water Quality Standards as they are currently written. The remedy to address the DO impairment may entail any one, or a combination, of several options. One option is to demonstrate that the low dissolved oxygen in the hypolimnion is a natural occurrence in accordance with 9 VAC 25-260-55. *Implementation procedure for dissolved oxygen criteria in waters naturally low in dissolved oxygen.* Another option may be to re-evaluate the currently applicable beneficial uses of the reservoir. DEQ will seek the input and active participation of stakeholders in the Occoquan watershed as a plan to address the 303(d) listing of the reservoir is developed.

4. On a more general issue, there are several new proposed listings based on causes other than the common general benthic or fecal coliform standards. Many of these impairments can be traced to a specific source or are a result of historical – and not present – inputs (such as PCBs or Chlordane). In these situations, little new useful information will be produced as a result of a traditional TMDL. Rather, the Commission suggests that the goals of cleaner water can be better achieved if the Department works directly with stakeholders to develop and implement mitigation strategies as an alternative to setting a traditional TMDL process in motion. This more direct approach is particularly important given the fiscal realities and time limitations being faced by the Department.

**Response:** DEQ acknowledges the validity of your comment and will consider this, and your suggestion to work directly with stakeholders, as plans to address impaired waterbodies due to historical activities are developed. TMDLs may be required nevertheless.

Commenter: James L. Bannwart, Upper Occoquan Sewage Authority

**COMMENT(S) AND RESPONSE(S):**

**UOSA's Comments Specific to the Listing of the Occoquan Reservoir**

1. We believe that the State water quality standards and beneficial uses may not be applicable to all water bodies at all times. EPA acknowledges this type of condition in 40CFR Part 131.10 by means of the removal of uses<sup>1</sup>, and/or the establishment of seasonal Water Quality Standards<sup>2</sup>.

The Occoquan Reservoir was developed and is utilized as a source of drinking water. This water body may not be able to meet water quality standards, criteria, or threshold values due to water quality management strategies critical to its primary use during specific times of the year, i.e., copper sulfate addition for the control of noxious algae. The reservoir may not be able to achieve the dissolved oxygen standard at the bottom waters due to the nature of the water body, that is an impoundment versus a free flowing stream.

We believe that all potential beneficial uses of the Reservoir should be protected, but utilizing a “one-size-fits-all” criteria or standards could result in more harm than good. For example, a TMDL developed for copper due to the addition of copper sulfate to control noxious algae may result in impairments of both the drinking water supply use and the aquatic life use of the Occoquan Reservoir. Refer to additional comments on copper under the **Dissolved Copper Caused Impairment to Aquatic Life Use** section of this letter.

**UOSA Recommendation:**

**We recommend that DEQ undertake a coordinated effort of protecting the uses of the Reservoir and not the disjointed application of independent Water Quality Standards, Criteria, or Threshold Values without regard as to how all uses are**

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<sup>1</sup> The Federal Regulations in 40CFR Part 131.10 allows for the removal of a designated use (that is not an existing use) if the State can demonstrate that attaining the designated use is not feasible for several reasons. Some of the reasons listed are

- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;
- Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use;
- Controls more stringent than those required by sections 301(b) or 306 of the Act would result in substantial widespread economic and social impact; others.

<sup>2</sup> 40 CFR Part 131.10 (f) States may adopt seasonal uses as an alternative to reclassifying a water body or segment thereof to uses requiring less stringent water quality criteria. If seasonal uses are adopted, water quality criteria should be adjusted to reflect the seasonal uses, however, such criteria shall not preclude the attainment and maintenance of a more protective use in another season.

**inter-related and inter-dependent. The Federal Regulations offer alternatives to address complex systems such as the Occoquan Reservoir to avoid the improper application of standards/criteria that could result in the loss of the one or more critical beneficial uses.**

**Response:** DEQ acknowledges the validity of the comments offered by UOSA and will take these into consideration. The DEQ is proceeding with listing the Occoquan Reservoir in the *2002 303(d) Report on Impaired Waters* as impaired due to suppressed dissolved oxygen levels in the reservoir. The source of the low dissolved oxygen is identified as the naturally occurring stratification of the reservoir. While the stratification, and resulting low dissolved oxygen levels, may be a natural process, the DO measurements do not comply with the Water Quality Standards as they are currently written. The remedy to address the DO impairment may entail any one, or a combination, of several options. One option is to demonstrate that the low dissolved oxygen in the hypolimnion is a natural occurrence in accordance with 9 VAC 25-260-55. *Implementation procedure for dissolved oxygen criteria in waters naturally low in dissolved oxygen*. Another option may be to re-evaluate the currently applicable beneficial uses of the reservoir as noted in the comments provided by UOSA. DEQ will seek the input and active participation of stakeholders in the Occoquan watershed as a plan to address the 303(d) listing of the reservoir is developed.

2. In discussions with the DEQ staff we learned that the Occoquan Reservoir listing as impaired for aquatic life due to exceedences of the dissolved copper water quality standard will be removed due to issues related to the procedures used for data collection. We, therefore, expect that the Occoquan Reservoir be moved from the 1A List in the 303(d) Report to the 1C List-Impaired due to Natural Conditions. Failure to make this correction would represent an inaccurate listing for the Reservoir.

Listing the Reservoir for aquatic life impairment now or in the future due to the exceedences of the copper water quality standard may fully impair the Reservoir for any use. Suspending the addition of copper sulfate to control noxious algae may completely impair the Reservoir for drinking water use due to poor aesthetic quality and for aquatic life use due to depletion of dissolved oxygen.

**Response:** The Occoquan Reservoir will be listed as impaired due to low dissolved oxygen with the source of the impairment attributed to natural conditions. The Reservoir will be listed in Part 1C of the 303(d) report.

3. We believe that the listing of the Occoquan Reservoir for low DO causes is an example of the application of a standard that cannot be met due to the nature of the water body, an impoundment versus a stream or river. We believe that applying a minimum DO of 4 mg/L standard to the bottom waters of a lake or impoundment is an improper application of water quality standards. Waters in lakes and reservoirs stratify due to temperature differences between surface and bottom waters. This well-known phenomenon should have been taken in consideration and a water quality standard developed for DO for lakes

and impoundments prior to the publication of the 303(d) list. Good science dictates that a Water Quality Standard for DO within impoundments should be developed prior to the next listing, and preferably prior to exhaustive effort to ascertain whether impoundment DO impairments based on inappropriate stream DO criteria are due to natural conditions.

We understand that based on the Water Quality Standards Regulation §9 VAC 25-260-55 the process to ascertain whether impairment is due to natural conditions the following steps are to be followed:

- *After the determination of natural occurring DO condition, the Board shall also conduct a watershed assessment to document anthropogenic sources that individually or cumulatively cause low dissolved oxygen concentrations including locating and identifying all point and non-point sources of pollution and identifying all other man-made activities to include water withdrawals that cause low flow conditions and result in low dissolved oxygen levels.*
- *The above-described process is subject to public comment.*
- *After the naturally occurring DO determination is made final, the Board shall initiate rulemaking to set site specific criteria.”*

We believe that the regulated-environmental community should be closely involved in the DO standards process and request active participation in this endeavor.

**Response:** As indicated in the response to Comment #1 above, the DEQ will explore the options for addressing the impairment due to low dissolved oxygen in the reservoir, and will seek the active participation of the various stakeholder's in the process.

3. As discussed earlier in this document, the Occoquan Reservoir Total Phosphorus (TP) listing in the “Cause” column in the tables in this report should be accompanied by the proper explanation for the listing, that is, “threatened.” Failure to list TP with the proper explanation is misleading.

UOSA reserves the right to request a site-specific study for the determination of the proper water quality standard or criterion for Total Phosphorus for the Occoquan Reservoir for the protection of beneficial uses.

**Response:** Your comment and suggestion for clarifying the tabular listing of impaired waters has been noted. We acknowledge that the tables can be somewhat confusing as multiple causes of impaired versus threatened waters may be difficult to distinguish. We have removed references to threatened conditions from the impaired waters list. This information will be posted separately on the DEQ website at [www.deq.state.va.us/water/303d.html](http://www.deq.state.va.us/water/303d.html). In addition, each non-impaired “Water of Concern” that is (Virginia’s definition of) threatened, will have a fact sheet on the website that will provide explanation of that concern for each applicable assessed segment in Virginia.

Commenter: Karen Canody, Roanoke Electric Steel

**COMMENT(S) AND RESPONSE(S):**

**PCBs in Fish Tissue**

1. Based on the limited data, Peters Creek should not be listed as impaired for PCBs

**Response:**

DEQ Assessment Guidance (see <http://www.deq.state.va.us/water/reports.html>) requires the designation of a segment as “Fully supporting, but threatened” if one species of fish is found with an exceedance of a single pollutant. The 2.53 mile Peters Creek segment is designated as ‘Threatened’, i.e. Water of Concern. A TMDL may be required only when a classification of "Partially Supporting" or "Not Supporting" is made. Two or more exceedances of the fish tissue screening value listed in table 6a of the Assessment Guidance cause designation of a water as "partially supporting" and represent the fish-tissue concentration of the toxic chemical that is the basis for the water quality criterion. These criteria have been adopted by the Water Control Board and are listed in 9 VAC 25-260-140.B under the column "Human Health, All other Surface Waters". These numerical water quality criteria are designed to prevent the fish from being contaminated to levels greater than a fish-tissue concentration (i.e. the screening value). A fish-tissue sample that exceeds the screening value indicates that the effect the water quality criterion is intended to prevent has occurred and the water quality criteria level of protection is not being supported. Monitoring for a pollutant in fish tissue is an alternate means of assessing whether the intent of the water quality criteria is exceeded.

2. The data are too limited to assess the waterbody as “threatened” for PCBs in fish tissue.

**Response:** Use support determinations were made in accordance with the Water Quality Assessment Guidance as amended, July 15, 2002. The Guidance document is available for viewing or download at: <http://www.deq.state.va.us/water/reports.html>

3. DEQ’s reliance on a screening value as the *de facto* “water quality standard” derived in an ad hoc manner without satisfying federal or state procedural requirements is legally indefensible.

**Response:** The screening values DEQ employs to assess the fish consumption use for possible impairment (SVs found in table 6a of the Water Quality Assessment Guidance) are directly linked to the water quality criteria designed to protect human health via fish consumption. These criteria and the underlying scientific data have undergone public review and comment during the water quality standards criteria adoption process. These fish tissue SVs are the fish tissue concentration that the water quality criteria are designed to protect and represent the level of protection intended by the water quality criteria.



Measurement of this concentration in fish tissue is an alternate way of assessing compliance with the 'human health' water quality criteria.

### **Organics in Sediment**

4. DEQ is ambiguous regarding the listing status of Peters Creek for organics in sediment. DEQ's Guidance Manual indicates that one or more exceedences of an effect range-median sediment SV means that the waterbody is fully supporting all uses, but is threatened. Yet Part 1A suggests that the waterbody is impaired. RES objects to any listing, even if the waterbody is identified as threatened rather than impaired. However, if DEQ continues to believe it can justify listing Peters Creek as "threatened," it should clearly state that in the listing documents.

**Response:** The 7.17 mile Peters Creek segment is a 2002 Impaired Water for the Swimming Use based on fecal coliform bacteria exceedences of the water quality standard geometric mean of 200 n/100 ml. Thus the Swimming Use is not supported in the segment and a Total Maximum Daily Load (TMDL) study required.

The fish consumption and aquatic life uses are 'Threatened' as noted in the Peters Creek Fact Sheet for Part 1A. The 2.53 mile 'Threatened' segment (fish consumption via fish tissue analysis and aquatic life use via sediment) is overlain by the 'Impaired' swimming use segment. 'Threatened' segments overlain by 'Impaired' segments were included in the same Fact Sheet to provide all information on an 'Impaired' segment in one narrative. Both US EPA Guidance (1997: see <http://www.epa.gov/owow/monitoring/guidelines.html>) and State Law (Water quality monitoring and reporting [§ 62.1-44.19:5.C.1]: see <http://legis.state.va.us/>) require listing 'Impaired' and 'Threatened' (Waters of Concern) segments.

Other commentors have raised the same concern that TMDL studies will be conducted for 'Threatened' parameters. The use of the sediment screening values alone does not result in an assessment of "partially" or "not supporting" and will not result in the requirement of a TMDL. TMDL studies will only be conducted on those segments with 'Impaired Use' designations for the specific parameter(s) identified as causing the use impairment. Fecal coliform bacteria are the parameter to be studied in the Peters Creek watershed.

Your concerns over the use of screening values for sediment are duly noted. DEQ agrees that there are fundamental concerns regarding the use of sediment screening values. DEQ uses these values only for identifying waters as threatened. The identification of waters as threatened is exclusively a management tool for DEQ to use to identify those waters where additional data should be collected via an ambient or special study program to determine whether actual water quality impairments exist.

Commenter: Mindy Tervo

**COMMENT(S) AND RESPONSE(S): via e-mail from DEQ West Central Regional Office  
On 7/30/02**

Ms. Tervo,

Your question:

Hello. I was just at the DEQ website, in search of information regarding the river status list. I wanted to know if the river I live on, the Little River, in Floyd/Montgomery counties is safe to swim. I was very disappointed at the quality of the list. For one thing, it was very difficult to read. Secondly, it was very hard to understand. The DEQ should make information of this sort easy to access, and easy to understand. I am still wondering about the status of my river, any suggestions? Thank you,

**Response:**

Thank you for your question and comments.

DEQ catalogs streams using Waterbody Identification Numbers. The entire Little River drainage spans 3 of these cataloguing units; they are VAW-N19R, VAW-N20R and VAW-N21R. If you download the Fact Sheets for the New River Basin please search using these codes to find information of interest, or search based on stream name, it will save you a great deal of confusion.

The Little River from the mouth of Meadow Creek extending downstream to the backwaters of Little River Reservoir is impaired for Swimming Use in 2002. Meadow Creek from the mouth of Mill Creek downstream to the Meadow Creek confluence on the Little River (Montgomery County) is also 2002 Impaired for the Swimming Use. Both of these impairments are in VAW-L21R. These impairments are based on total fecal coliform bacteria exceedences of the DEQ's water quality instantaneous standard of 1000 bacteria counts per 100 milliliters of water. (Commonly expressed as 1000 n/100 ml). DEQ tests for all coliform bacteria.

Little River is also impaired for the Aquatic Life Use due to temperature excursions of the natural trout water temperature criterion of 20° centigrade (VAW-N19R). The temperature impairment is located in the upper portions of the drainage and extends from the mouth of yet another Meadow Creek (Floyd County) downstream to the Oldfield Creek confluence on Little River. (Two creeks within the same drainage having the same name is confusing, even to us!)

There are two other tributaries that have a 1998 Swimming Use Impairments; Dodd Creek (VAW-N20R) in Floyd County and Mill Creek (VAW-N21R) in Montgomery County. These waters remain impaired as assessed in 2002. Total

Maximum Daily Load (TMDL) Studies are nearing completion on both these streams, in fact their completion date is August 1, 2002. Once the study has been reviewed it will be posted to the DEQ website on the TMDL Program Page.

Unfortunately DEQ does not possess the resources to sample and assess every stream mile in the Commonwealth. Approximately twenty percent (20%) of the 50,000 stream miles in the state are monitored and assessed. Monitored sites are presented in the map application described below along with some locational information and a link to the DEQ database that houses chemical data for a specific site.

The mapping application should aid in locating impaired segments and their spatial extent. Please return to the DEQ website (<http://www.deq.state.va.us>) and Click on the **Impaired Waters Report** located on the right hand side of the DEQ Home page. This mapping application is very similar to other mapping applications on the web like Map Quest or TopoZone. (Instructional information is below. If you prefer you may call the number below and I will be happy to walk you through the application.)

1. The next page presents a short narrative of state totals and to the right of the narrative you will see a box entitled **Geographic Environmental Mapping System** inside the larger box you will see a smaller box titled **Virginia DEQ Environmental Mapping system**. Click on this box.

The next page that appears is located at the Virginia Economic Development Partnership website who is currently hosting our mapping application. Click on the second button titled **Impaired Waters** located on the left in the middle of the page.

2. In a moment a state map will appear with Interstate Highways and River Basins color coded. The New River Basin appears as a **lighter pink** color. Note that the 'Zoom In' button on the upper left is highlighted in light blue. With your cursor click and hold the left mouse button down and drag it across the Montgomery/Floyd county line area of interest forming a rectangular box. Then release the button.

Another Map will appear with greater detail than the first. Please take a moment to look at the buttons on the Left Panel and Layers of Information available on the Right Panel. The Left Panel contains a series of buttons that allow you to move around within the map and make selections to view data associated with the map features. The right panel now has more listings of information available to view. Notice that the Impaired Rivers and Streams layer is highlighted and there is a black dot in the small white circle that precedes it. This means data associated Impaired River segments is available to select and view. (For queries of the other layers click in the small white circle and that layer will become active. Queries

can only be made on an active layer. To make a layer active just Click in the small white circle and a black dot will appear.)

3. Method 1: Click the Find Button on the Left Panel and a box will appear where one types in the stream name 'Little River' and press 'Enter'. (Impaired Waters Active). All streams named 'Little River' will be selected. (There are several in the Commonwealth). The listing of Fact Sheets will appear under the Map Panel with the Basin for each. Select the New River Basin Fact Sheet(s) by clicking the number in the first column titled 'Click for Fact Sheet'.
  4. Method 2: Impaired streams appear as thin red lines. On the left Panel you will see a button titled *SELECT RECTANGLE* click this button, click hold and drag as before for the area of interest. If impaired segments are within the selection box those stream segments will become highlighted in yellow and a table will appear below the map listing those segments with stream name and other information. If multiple segments appear in the table one can scroll down the table listing. Zoom to these results will be at the bottom of the table. Click and the map will zoom in on only the selected segments.
- The first column Titled 'Click for Fact Sheet' contains a number. If you click on the number, a Fact Sheet will appear containing all the information relating to that stream's impairment, causes and sources. This Fact Sheet can be printed or saved to disk for later review. When you close the Fact Sheet you will note that the map has zoomed in on the selected segment and turned red to indicate its size and relation to other features around it.

Commenter: Brett A. Vassey, Virginia Manufacturers Association

DEQ responses to VMA comments:

VMA comment: Designating a waterbody as biologically impaired is not sufficient reason for listing until the source of impairment is identified and questions concerning the use of narrative criteria.

**Response:** Virginia has narrative biological criteria as described in the water quality standards in 9 VAC 25-260-10.A which lists designated uses as including "all state waters, including wetlands, are designated for the following uses:...recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g. fish and shellfish". The Virginia general standard 9VAC 25-260-20.A states that "all state waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life". The Virginia Biological Monitoring Program uses the procedures and methods that are recommended in the EPA guidelines *Rapid Bioassessment Protocols for Use in Streams and Rivers* (EPA/444/4-89-001) in conducting biological monitoring and assessments of the data to classify the biological community at monitored sites and to assess the attainment of the narrative biological standard.

The U. S. Environmental Protection Agency requires Virginia to have narrative biological criteria such as described above. The U. S. Environmental Protection Agency also requires DEQ to use biological assessment data in the assessment of attainment/impairment of the uses of a waterbody.

The Virginia Water Quality Monitoring Information and Restoration Act (WQMIRA) in §62.1-44.19:5 B.4. provides for increased use of macro-invertebrate organism and fish tissue monitoring and provide for specific assessments of water quality based on results of such monitoring. §62.1-44.19:5 C states that the 303(d) report shall identify geographically defined water segments as impaired if monitoring or other evidence shows "significant declines in aquatic life biodiversity or populations".

It is clear that the intent of the U. S. Environmental Protection Agency and the Virginia Legislature is for DEQ to use available biological monitoring data in the assessment of Virginia waters. The DEQ Guidance manual for this assessment describes how the assessment of biological monitoring data will be carried out, thereby providing a translator of the narrative biological standard. The methods

used to assess the biological data are consistent with ways these data were assessed in past assessments.

VMA Comment: Recommends that DEQ use a draft Consolidated Assessment and Listing Methodology (CALM) document first published as a draft document in July 2002.

**Response:** This CALM document was published well after the DEQ assessment process was complete and there is insufficient time to conduct an entire reassessment based on any changes in that document. When addressing the use of narrative criteria, the VMA quotes from this draft July 2002 CALM guidance document a section that specifically refers to chemical data and narrative criteria for toxics and refers to the need for a translator to apply this narrative criteria to point source discharges. The Virginia biological criteria are not specific to toxic pollutants and the assessment of an impaired status for the biological standard is not the same as that of a chemical specific criterion. The CALM comments quoted in the VMA comments do not specifically apply to the biological criteria issues.

The CALM quote cited by VMA says that EPA encourages states to use chemical data to interpret narrative criteria and that states should develop implementation procedures that explain how different types of data are used to make attainment/impairment decisions based on narrative criteria. The DEQ 305(b) guidance document provides descriptions of Virginia's implementation procedures.

VMA Comment: Several court decisions are referenced.

**Response:** DEQ staff are not able to respond to issues regarding the relevance of specific legal issues. However DEQ does note that the Court decisions in West Virginia that were cited were overturned by the West Virginia Supreme Court, and that West Virginia law and the West Virginia biological monitoring program are not necessarily the same as Virginia's.

A California court decision dealt with narrative toxicity standards applied as numeric limits (presumably permit issues). These are not the same issues as biological impairment assessments.

VMA Comment: Cause of measured biological impairment must be determined before a water body is listed.

**Response:** Previously, EPA Region III had instructed DEQ to use available biological assessment data showing impairment to make 303(d) listing decisions. This did not include tying a biological impairment to a specific pollutant. The biological monitoring assessments and identification of which waters are impaired is the first step. The next step in the process (after additional biomonitoring to confirm the impaired status) is trying to determine what the cause of impairment may be at any particular site through a TMDL study. The determination of what the cause of the impairment is requires additional research and study. If after that additional study it is determined that the cause of the impairment were not a reason for listing the site, DEQ would pursue the reclassification of the waterbody.

VMA Comment: Listing decisions should not be made on the basis of Screening Values

**Response:** The fish tissue screening values used by DEQ to assess the fish consumption use for listing decisions are the fish tissue concentrations that are the basis for the water quality criteria designed to protect human health. Virginia Water quality criteria listed in 9 VAC 25-260-140 B under "Human Health" are designed to prevent fish from bioconcentrating toxic pollutants to levels that presents increased potential risk to consumers of the fish. Allowing fish to become contaminated above an allowable level of contamination is considered unacceptable as it represents a impairment of the "fishable " use applied to all waters in Virginia as specified in the general standard 9 VAC 25-260-10 A which states "...production of edible and marketable natural resources, e.g., fish and shellfish". The water quality criteria are based on first determining a concentration in fish tissue that is considered to be an acceptable daily dose to a human consumer, i.e. a concentration in fish tissue that represents an acceptable risk to consumers under the exposure assumptions used in calculating the criteria. This is the fish tissue concentration that DEQ uses as a fish tissue screening value. The principal difference between the calculation of the water quality criterion and a fish tissue screening value is the use of a bioconcentration factor (BCF) in calculating the water quality criteria.

Once an acceptable concentration in fish tissue (a tissue screening value) is determined, it is necessary to convert that fish concentration into a water concentration for use as a water quality criterion. A bioconcentration factor is used to convert or translate that fish tissue concentration into an acceptable concentration in water for use as a water quality criterion. A water concentration at or below the water quality criteria concentration should not result in any fish in the waterbody that are exposed to the water quality criteria concentration in the water column from bioconcentrating the pollutant to concentrations higher than the corresponding tissue screening value.

The calculation of the tissue screening value is an integral part of the calculation of the water quality criteria and involves the same toxicological data and assumptions for average body weight and fish consumption rate. When the State Water Control Board (SWCB) adopted the water quality criteria, the assumptions of an average body weight of 70 kg and a fish consumption rate of 0.0065 kg/day were accepted as the basis for the human health water quality criteria. The fish tissue screening values listed in Table 6a of the guidance for this 305(b)/303(d) assessment is the basis for the water quality criteria listed in 9 VAC 25-260-140 B under "Human Health". Thus, contamination of local fish to a concentration that exceeds these fish tissue screening values represents the actual effect that the water quality criteria is designed to protect against.

The screening values listed in Table 6a of the DEQ assessment guidance document are for toxic pollutants that Virginia has adopted water quality criteria. These screening values are used as an equivalent means of assessment of the intent of the Virginia water quality criteria that are listed in 9 VAC 25-260-140 B under "Human Health". One exceedance of these screening values will be cause for a "fully supporting but threatened" classification, while two exceedances in fish samples will be cause for a "partially supporting" or impaired assessment. The screening values listed in Table 6b of the 305(b) guidance document are for toxic pollutants that Virginia has not adopted water quality criteria. However they are based on the same calculations and same assumptions as used in the calculation of the screening values. Because the assessment of these chemicals has not been subject to the rigorous public participation that the water quality criteria chemicals have undergone in Virginia, exceedances of these screening values will result in a "threatened" classification but not an "impaired " assessment.

Toxic chemicals are treated differently depending on whether or not they are a known or probable human carcinogen. For noncarcinogens, toxicological data are used to develop a value (a reference dose of RfD) which is used to estimate a concentration in fish that is assumed to pose no appreciable risk to consumers (at the level of exposure assumed). For carcinogens, toxicological data are used to develop a value referred to as a cancer slope factor (CSF) or a cancer potency factor that quantifies the potency of the chemical in causing cancer. For carcinogens, generally any exposure to the chemical is thought to represent some small risk of cancer and increases in exposure are thought to result in incremental increases in extra cancer risk. A level of acceptable extra risk is used to calculate an acceptable fish tissue concentration (screening value as used by DEQ) which is then converted using a bioconcentration factor into a water concentration for use as a water quality criterion. In this way, it is hoped that fish contamination can be controlled and limited to the screening value so that extra cancer risk posed by consumption of those fish should not exceed that level of acceptable added cancer risk. When the water quality criteria were adopted by the SWCB, they selected an acceptable extra cancer risk of 1 in 100,000.



The formula for calculating the water quality criteria and the screening values, along with example calculations are shown below. The formula produce a final product expressed as a concentration in parts per million and these are converted into parts per billion by multiplying by 1000. For simplicity, units are left out but are explained in the footnotes.

### Noncarcinogen:

$$\text{Water quality criteria (mg/L)} = \frac{\text{RfD} \times \text{BW}}{(\text{CR} \times \text{BCF})} \quad \text{Screening Value (mg/kg)} = \frac{\text{RfD} \times \text{BW}}{\text{CR}}$$

**Example: Acenaphthene** (9 VAC 25-260-140 B, water quality criterion = 2,700 ppb)

| <b>Acenaphthene</b><br>BCF = 242<br>RfD* = 0.06 mg/kg/d | <b>Water quality criterion</b>                                      | <b>Equivalent Tissue Screening Value</b>        |
|---|---|---|
| <b>Formula (noncarcinogen)</b>                          | $\frac{\text{RfD} \times \text{BW}}{(\text{CR} \times \text{BCF})}$ | $\frac{\text{RfD} \times \text{BW}}{\text{CR}}$ |
| <b>Calculation</b>                                      | $\frac{0.06 \times 70}{(0.0065 \times 242)}$                        | $\frac{0.06 \times 70}{0.0065}$                 |
| <b>Final Value</b>                                      | 2.670mg/L (ppm)<br><br>~ 2,700 µg/L (ppb)                           | 646.15 mg/kg (ppm)<br><br>~ 650,000 µg/kg (ppb) |

### Carcinogen:

$$\text{Water quality criteria} = \frac{\text{RL} \times \text{BW}}{\text{CSF} \times (\text{CR} \times \text{BCF})} \quad \text{Screening Value} = \frac{\text{RL} \times \text{BW}}{\text{CSF} \times \text{CR}}$$

**Example: PCBs (total), proposed 9 VAC 25-260-140 B,**  
**water quality criterion = 0.0017 ppb**

**BCF = 31,200**

**CSF = 2**

**(CSF\* updated in EPA-IRIS 1997)**

|  |   |   |
|--|---|---|
| <b>PCBs (total)</b><br><b>BCF = 31,200</b><br><b>CSF = 2</b> | <b>Water quality criterion</b>                              | <b>Equivalent Tissue Screening Value</b>    |
| <b>Formula (carcinogen)</b>                                  | $\frac{RL \times BW}{CSF \times (CR \times BCF)}$           | $\frac{RL \times BW}{CSF \times CR}$        |
| <b>Calculation</b>   | $\frac{0.00001 \times 70}{2 \times (0.0065 \times 31,200)}$ | $\frac{0.00001 \times 70}{2 \times 0.0065}$ |
| <b>Final Value</b>   | 0.0000017258 mg/L (ppm)<br><br>~ 0.00017 µg/L (ppb)         | 0.0538 mg/kg (ppm)<br><br>~ 54 µg/kg (ppb)  |

Note: final water quality criteria and screening values are rounded to two significant digits

Assumptions used in calculations:

BW = average adult body weight 70 kg (154 lbs.)

CR = fish consumption rate 0.0065 kg/day (6.5 grams/day).

BCF = bioconcentration factor (values used as recommended by EPA Water Quality Criteria, 1980)

RL = acceptable extra risk level for extra cancer risk. In Virginia water quality criteria; 1 additional cancer in 100,000 population, or 0.00001.

RfD = reference dose (acceptable daily intake concentration assumed to cause no adverse effects)

CSF = cancer slope factor (or cancer potency factor) a measure of carcinogenicity

\* RfD and CSF are obtained from the EPA database IRIS

VMA Comment: For PCBs in fish tissue, DEQ should use Trophic Weighting to reflect the Average Tissue Concentration to which consumers might be exposed

**Response:** Virginia Water quality criteria listed in 9 VAC 25-260-140 B under "Human Health" were developed using the above formulas and calculations as recommended in the EPA guidelines and methods for developing water quality criteria designed to protect human health that were current at the time the water quality criteria were developed and adopted in 1992 and during the second triennial review in 1997. The development and adoption process for these water quality criteria involved extensive public participation and numerous public comment opportunities before they were adopted. The public was informed of the methods DEQ used to calculate the human health water quality criteria and that

the intent of these criteria was to prevent fish contamination above unacceptable levels. The data used in the calculations were presented to the public and included the toxicological data and bioconcentration factor as well as the assumptions of fish consumption rate, body weight, acceptable risk level.

The possible uses of trophic levels were not included in the development of the current Virginia water quality criteria, nor has this approach been proposed for use in calculating the water quality criteria being proposed for adoption during the 2002 Triennial Review. EPA introduced the possible use of apportioning the fish consumption among different trophic levels in their recent revision of their guidelines for developing water quality criteria. This EPA revision was developed after the existing Virginia water quality criteria were originally developed and adopted. This new methodology for developing human health water quality criteria contains numerous differences from the original methods. The new methods are not the basis for the current criteria and this new approach has not been proposed for use in Virginia. There are several other changes in the new methodology that are significantly different from the previous methods, the trophic level approach is just one of the different factors involved. EPA developed the new guidelines after much work and public participation and the new methodology involves using a combination of a number of different factors that are to be used together to calculate the criterion. All the factors in the new methodology are to be used in order to use the new methodology properly. EPA has informed the states that if the new guidelines are used to adopt or readopt human health water quality criteria the new methods are to be used in their entirety in calculating the new criterion. States cannot "pick and choose" certain factors from the new methodology and ignore other factors that are part of the new methodology.

The revised EPA methodology uses the idea of apportioning the pollution to different trophic levels in conjunction with a significantly higher fish consumption rate of 17.5 grams/day (about 30, seven to eight-ounce meals per year). This new recommended fish consumption rate is based on more recent information and is thought by EPA to better estimate the average consumption rate for recreational fishers. In conjunction with this new recommended fish consumption rate, the trophic level apportioning approach was developed for use in the new methodology.

The use of the trophic level approach combined with the higher fish consumption rate is recommended in the new EPA methodology. VMA cites three examples of references for using a trophic level approach; the *Methodology for Deriving Ambient Water quality criteria for the Protection of Human Health* (US EPA 2000), the *Water Quality Criterion for the Protection of Human Health: Methyl mercury* (EPA 2001) and the example cited of the Georgia Environmental Protection Division proposing to use this assessing mercury in fish tissue. In all three of these examples the use of trophic levels is used with the higher fish consumption rate. The fish consumption for each trophic level was apportioned

among a total fish consumption rate of 17.5 grams per day. This methodology apportions 3.8 grams/day to the trophic level 2 (the bottom and filter feeding fish or shellfish), 8.0 grams/day of the trophic level 3 (the midlevel carnivores) and 5.7 grams /day for the trophic level 4 (the upper level carnivores). None of the examples cited recommend or advocate using the trophic level approach with the older, lower consumption rate of 6.5 grams a day. The new EPA methodology includes provisions for the use of site-specific fish consumption rates, but these are intended to apply to fish consumption rates derived local surveys of fish consumption patterns for local or regional waterbodies. DEQ is unaware of any acceptable quality surveys for Virginia waterbodies at the present time and thus would have to defer to the recommended default values recommended by EPA in order to use the trophic level apportioning approach in a valid manner.

DEQ believes that the trophic level approach cannot be used for the evaluation of the current human health water quality criteria for this assessment cycle since this approach was not part of the development of the existing Virginia criteria. The fish tissue screening values DEQ used in performing the assessment have a direct link to the current criteria; to use this new method to assess the existing criteria would disconnect that direct link.

The general public is not aware of this method and they have not been given the opportunity to comment on the acceptability of this approach. DEQ strongly believes that the public needs to be given the opportunity to review and comment on any significant change in criteria development or assessment methods. Since there is no time available to make a major change in the criteria or the assessment process before the 2002 305(b) report is finalized, this method of assessing the data cannot be used at this time. However, in the future DEQ is willing to explore this method further and consider the acceptability of using some way of using this method in future assessments of impaired waters or considerations of possible modifications of the criteria. This needs to be done in conjunction of a reevaluation of the appropriate fish consumption rate that should be used with this approach since the two factors are inexorably linked.

VMA Comment: Exceedances from a single sampling event cannot be considered an adequate rationale for listing, yet most of the waterbodies on the 303(d) list have been placed there based on a single sampling event.

**Response:** Since the fish tissue screening values are a direct way of measuring the attainment of the level of protection intended by the water quality criteria (i.e. preventing fish contamination to above certain levels), DEQ has treated these data in an equivalent manner. DEQ used the same decision guidelines that would apply to a datum showing a water column concentration that exceeded a water quality criterion. That is, the assessment guidelines are such that a single fish sample that exceeds the screening value is used to list the "fully supporting but threatened", while two samples that exceeded the screening values were required to result in a "partially supporting" or "impaired" assessment. In this way a

water body will not be listed as impaired unless two or more samples have shown fish contamination above the level intended as acceptable by the human health criteria. Typically the data for the assessment cycle will consist of only one sampling event at any one site. Fish tissue concentration data are not short term or instantaneous concentration values. The fish tissue concentrations represent long term averages and represent the levels of contaminants the consumers can be expected to be exposed to for that trophic level in that water body. Using this approach with fish tissue, we have a high level of confidence that the fish tissue data are indicative of a long-term assessment of the waterbody. The fish concentration represents a long-term average of the amount of pollutant that has bioaccumulated in the fish during its lifetime, usually two or more years. The DEQ fish-sampling program makes every effort to sample and analyze the size fish and species that are typically caught and consumed. Fish in three trophic levels are collected wherever available and the emphasis is placed on collecting and analyzing the more popular sport fish. Resources do not allow collection of every species in some the waterbodies and the species caught are intended to be representative of their trophic levels. Some waterbodies do not contain some species of the more popular sport fish in sufficient numbers to allow an adequate sample to be collected. The gizzard shad is collected and analyzed when other more popular sport fish in the trophic level are not available in a waterbody.

VMA Comment: VMA recommends not using PCB concentration data for gizzard shad a species that VMA states is little used for human consumption.

**Response:** DEQ's fish tissue monitoring program is designed to collect a limited number of species at each sample site typically three species are collected at each site but depending on available funding or site-specific concerns, sometimes up to five species may be collected. Under these conditions, a single species that exceeds a screening value represents 33 % to 20% of the samples, depending on whether the standard three species were collected or the less frequent five species sample was collected.

DEQ fish monitoring program staff attempt at each site to collect species representative of different trophic levels or different feeding patterns, i.e. an herbivorous species or primary consumer, a midlevel predator and a upper level predator. Limited resources do not allow the program to collect all species at each site nor is the program intended to be a complete census of the fish community at the site. As such, the collected species represent surrogates for other fish with similar feeding patterns that are resident in the waterbody. Gizzard shad feed directly on microscopic algae and crustaceans in the water column and also pick through the bottom sediments. DEQ prefers to sample catfish or carp or other fish species as the representative sample for "bottom feeder" but in some waterbodies the catfish or carp are not abundant and gizzard shad is the most commonly encountered species.

The gizzard shad is a common resident in many of Virginia's waters. While it is not a popular game fish, DEQ cannot assume that it is not ever consumed. Anecdotal information suggest that for fishers who fish for food rather than for sport are intent primarily on acquiring a meal and any fish species of reasonable size is sometimes eaten, especially the species that are common in the waterbody. At some sites the gizzard shad is the only species available for collection in sufficient numbers for an adequate sample for the herbivorous trophic level. In assessing the available fish tissue data from a site, if only the gizzard shad exceeds the screening value the water body will be assessed as fully supporting but threatened. Only if an additional sample for another species is also above the screening value will the waterbody be classified as partially supporting (i.e. impaired). Under this approach two different samples exceeding the screening value will represent 40% to 66.7 % of the available fish samples.

Robert C. Hale, Professor  
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Dept. of Environmental & Aquatic Animal Health  
College of William & Mary

Sept. 19, 2002

## **RESPONSE TO VIRGINIA MANUFACTURING ASSOCIATION COMMENTS ON PCBS IN FISH**

### **Virginia DEQ's § 305(b) Water Quality Assessment and § 303(d) Report on Impaired Waters**

The analytical method employed at VIMS to determine halogenated contaminants, including PCBs, has not been subject to EPA-sponsored interlaboratory testing, i.e. extensive interlaboratory studies performed in order to determine variability in the method's performance between different labs. However, its performance has been evaluated by VIMS using generally accepted quality control parameters. These include periodic blanks to assess possible laboratory contamination, use of pertinent surrogate standards (in this case four actual PCB congeners absent from commercial mixtures) to assess recovery within each sample and to increase accuracy of determinations, use of an internal standard to eliminate errors associated with variable extract final volume and matrix factors, analysis of duplicate samples to determine precision and a certified reference material (fish) to assess accuracy. Use of a method other than one that has been subjected to formal EPA interlaboratory validation does not invalidate the results of that method. Indeed EPA is accepting of performance-based methodologies, especially in exploratory exercises such as this. The analytical results themselves and their appropriateness to the questions being asked are the real issue. Ironically some EPA "validated" methods are crude, outdated and limited in their ability to ascertain the presence of not only the specifically targeted compounds, but also other coincident emerging pollutants of concern. This is related in part to the long time delays in completing governmental interlaboratory validations, their cost and general application only to the most prominent contaminants (instead of all those of environmental significance, see PBDE discussion below) and the uneven capabilities and resources of most (contract) laboratories.

Both VIMS and EPA Method 1668 employ high-resolution gas chromatography (GC) and determine a substantial suite of the individual PCB congeners present. Thus they have significant accuracy advantages over other methods that quantitate using Aroclor approaches or examine only subsets of the total PCBs present. Both methods use a nonpolar solvent to extract the analytes, followed by polarity and size exclusion cleanup. We dry (lyophilize) the fish samples prior to extraction. This provides better analyte/solvent contact, eliminates the need to introduce a bulky drying reagent and permits the extraction of a larger sample. The mass of sample we extract is approximately 10-fold greater than Method 1668 (wet weight equivalent 100 gm versus 10 g in 1668). This increases the representative nature of the sample analyzed (an apparent VMA concern). We typically dissect and homogenize a total of 200 gm wet minimum (if sufficient fish is available). The 10 gm (dry weight basis) is obtained from this aliquot.

VIMS uses electrolytic conductivity detection in the halogen selective (ELCD-HS) mode, versus high resolution mass spectrometry (HR-MS). HR-MS limits the utility of the 1668 method somewhat, as few labs have such an instrument and associated costs are prohibitive...a likely

reason for its lack of interlab validation by EPA. HR-MS has the benefit of higher selectivity, but in turn lacks the capability to detect the presence of other halogenated compounds for which masses have not specifically been pre-established and entered into the MS software for monitoring. Method 1668 only determines PCBs. We also determine concentrations of chlorinated pesticides, polybrominated diphenyl ethers (PBDEs) and other halogenated contaminants that might threaten the health of wildlife and the citizens of the Commonwealth of Virginia. Notably, several of these other compounds (e.g. chlorinated pesticides) are also the subject of existing EPA criteria for fish tissues. Obviously concern should be for both the PCBs that might be in the fish, as well as a suite of other possible contaminants. This makes the use of an EPA “validated” PCB method here inappropriate and cost ineffective.

We have over 15 years of experience applying this approach to halogenated pollutants in environmental extracts and have extensive expertise recognizing chromatographic patterns of PCBs and other contaminants in fish tissue. It is noteworthy that this pattern evaluation is done by a Ph.D. chemist, rather than a revolving collection of technicians as in most contract labs. When chromatographic patterns deviate and concentrations of said compounds are significant (greater than 50 ug/kg) we typically subject the extract to full scan MS to confirm identities. This general approach has been very successful, reducing cost to Commonwealth taxpayers, while vastly improving our capability to screen for a plethora of potentially toxic chemicals...a common interest of VIMS, DEQ, VMA and the citizens of Virginia. A graphic example: We recently detected the highest concentrations of polybrominated diphenyl ethers (PBDEs) in edible tissue in the world in fish obtained by DEQ in the course of their VA Tributary Monitoring program. These results were subsequently subjected to scientific peer review and published in high caliber journals (i.e. Hale, R.C. et al. 2001. Polybrominated diphenyl ether flame retardants in Virginia freshwater fishes (USA). Env. Sci. Technol. 35:4585-4591). These emerging contaminants of concern would have been overlooked if we had relied on an EPA interlab validated methods. Indeed, we also recently published a paper in Nature that reports on the extraordinary concentrations of PBDEs in U.S. sewage sludges (Hale, R.C. et al. 2001. Flame retardants: Persistent pollutants in land-applied sludges. Nature 412:141-2.). EPA “validated” methods overlooked these PCB-like chemicals for years, despite their presence at levels orders of magnitude greater than the coincident PCBs. These chemicals are not being taken lightly. For example, the PBDE formulation we detected is being banned next year throughout the Europe Union after an extensive risk assessment. They are the subject of an emerging contaminants workshop in October 2002, sponsored by the EPA Chesapeake Bay Program. Our PBDE findings also were mentioned prominently in the July 2002 National Academy of Sciences’ review of the risk assessment performed by EPA for biosolids.

We have previously participated in interlaboratory comparisons of methods. This spring we participated in an international interlab exercise on PBDEs. Our determinations of PBDEs in fish were among the best and the approach we used largely follows the PCB methods used here. Our methods for the analysis of chlorinated compounds have also been published and we have been invited to submit reviews in respected scientific journals on the subject (e.g. Hale, R.C. & J. Greaves. 1992. *Invited Review*: Chromatographic methods for the analysis of persistent chlorinated hydrocarbons. J. Chromatogr. 580:257-278; Hale, R.C. & M. Gaylor. 1995. Analysis of PCBs in fish tissues using supercritical fluid extraction. Environ. Sci. Technol. 29:1043-1047).



We also have examined governmental reference materials with the method used to determine PCBs et al in Virginia fish for the DEQ, notably a fish certified reference material (Carp-1 CRM) for PCBs. NIST results for this CRM have been published in Analytical Chemistry (Vol 69:4210-4219 (1997)). Similar, but less extensive, tabulations are available from Environment Canada. NIST quantitated 25 peaks corresponding to PCBs. Our total PCB value for these 25 peaks (including any potential non-PCB chromatographic coeluters...again a VMA concern) were in excellent agreement with NIST, differing by only 4.80% (i.e. 1410 versus 1480 ug/kg: VIMS:NIST).

As pointed out by the VMA, anytime an absolute numerical “cutoff” or threshold is invoked there is an inherent problem, as all analytical procedures have some error and uncertainty. A significant portion of this variability is matrix specific, i.e. varies from sample to sample, and thus the exact concentration in a sample is always unknown. Thus the scenario discussed by VMA on p. 17 (paragraph 2) is a conundrum. The only way around this is to analyze multiple aliquots of fish collections that are near the threshold value. In fact DEQ typically does just that when initial PCB data indicates a problem in a given area. It is also important to keep in mind that fish are mobile and the greatest source of variability in PCB concentration is generally not in the analytical laboratory. The variability associated with field sampling and within the natural population are typically several times higher...commonly on the order of 200%. In this context preoccupation over potential errors of a few percent due to lab variability is misplaced.

The VMA is correct in its presumption that analysis of duplicates of fish was not routinely conducted (p. 18; paragraph 1). We view this as a cost-savings measure to VA taxpayers, in a project that is really an exploratory exercise aimed at pinpointing regions and chemicals of concern. However, the precision of our approach is apparent from data for four duplicates of fish, collected for the determination of PCBs in fish from the New River (a follow-up special DEQ study, triggered by previous high PCB data), that were analyzed coincidentally with the trib fish samples. Total PCB concentrations covered a range from less than 50 ug/kg total PCBs to over 3000 ug/kg. The % differences between duplicates were only 2-4%.

| Fish number | Concentration |       | Difference | Mean   | Percent Diff/mean |
|-------------|---------------|-------|------------|--------|-------------------|
|             | Rep A         | Rep B |            |        |                   |
| 5           | 47.5          | 48.5  | -1         | 48     | -2.08             |
| 16          | 39.6          | 41.3  | -1.7       | 40.45  | -4.20             |
| 20          | 3022          | 3137  | -115       | 3079.5 | -3.73             |
| 31          | 2363          | 2448  | -85        | 2405.5 | -3.53             |

Likewise, concern over “detection limit” is a “non-starter” issue, particularly in regards to a fish PCB threshold being exceeded. First, the potential issue really is quantitation limit (QL), i.e. the minimum value quantifiable in a given sample, not “detection limit” (an instrument parameter). The QL will again vary by matrix. Our QLs are typically less than 1 ug/kg per congener wet weight in fish (varying with the degree of halogenation of the analyte), substantially lower than the fish PCB threshold values. Thus, they really do not come into play with respect to threshold exceedance.

As noted by VMA, precision and accuracy are two different things. We need both accuracy and precision. Either parameter alone is useless. In addition to our results mentioned above for duplicates and the fish CRM, we included four PCB surrogate standards in each fish sample examined as an additional mechanism of estimating analytical precision and accuracy. Of the four surrogates (PCB30, 65, 121 and 204) we have focused on the recovery of PCB204, as it is most comparable to the physical properties of the bulk of the expected analytes. PCB204 also is recovered in the greatest yields, as it is the least volatile. We have used its recovery in each fish sample to correct the analytical data in that fish sample, as our goal is to estimate the true concentration in the tissue. In this context we have actually taken a numerically conservative approach, i.e. most analytes are recovered in similar or lower yields than PCB204. The data produced are more accurate than if no correction step was taken. Thus, we are not be “overcorrecting”, as VMA appears to assume. We have tabulated these PCB surrogate recovery for all the fish samples analyzed in 2001 for the Trib Project below.

|                | PCB30       | PCB65       | PCB121      | PCB204      |
|----------------|-------------|-------------|-------------|-------------|
| <b>Mean</b>    | <b>69.1</b> | <b>74.0</b> | <b>78.5</b> | <b>84.6</b> |
| <b>Std Dev</b> | <b>14.1</b> | <b>15.2</b> | <b>15.9</b> | <b>17.3</b> |

When low or high PCB204 recoveries were obtained in the fish samples, these samples were slated for reanalysis provided that additional tissue was available. Note that the above statistics include both these recovery “outliers” and the reanalyzed samples. Thus it is a “worst-case” representation of our recoveries. Nonetheless, 84.6% recovery is excellent.

On p. 19 VMA expresses concern over possible variability in the final volume of the extract affecting final PCB results. In our work final volumes were 0.5 ml +/- about 10%. The use of an internal standard added into this volume obviates the impact of final extract volume and subsequent PCB quantitation. External standard approaches are vulnerable to such error, but were not used here.

Other specific VMA questions (mentioned on p. 19):

We note some **reduction of response of the PCBs as congener concentration decreases**. This effect occurs at a concentration in fish (wet weight basis) of less than 1 ug/kg. Above this, response is consistent with concentration. Internal standard concentration is a constant in the extract, and thus is not a factor. Any such decrease in PCB response would result in our potentially underestimating the concentration of the analyte and thus total PCB concentration. This could result in not exceeding a threshold, never falsely triggering one. However, as the decrease in response occurs at less than 1 ug/kg, any impact is likely negligible.

**Variability of initial sample composition** As noted above, we initially remove 200 or more grams of tissue (wet weight) from each composite of fish provided by DEQ. We homogenize and dry this (obviating the introduction of a bulky and potentially contaminating dessicant) and then homogenize and analyze half, equivalent to 100 g wet mass. EPA Method 1668 works with a sample 1/10 of this size, as do virtually all “validated” PCB procedures in use, hence our approach appears far superior.

**Error associated with the wet to dry “extrapolation”.** We determine percent water on each sample in the course of the freeze-drying step. This involves simple gravimetric measurements. Errors determining this are less than 5%. As an illustration, we applied a % water correction to our determination of PCBs in CRM Carp-1. Our PCB results (which also incorporate errors in PCB extraction, cleanup and quantitation) compared very well (within 5%) to the NIST results. If our water conversion method was problematic, our results would have been proportionally affected....likewise for our analysis of the fish sample in the international PBDE interlab exercise.

**Impact of “high” PCB surrogate recoveries.** Our mean (std dev) recovery of PCB204 was 84.6% (Std dev 17.3%). These included samples we deemed were outside of the norm (low or high PCB204 recoveries) and were subsequently reanalyzed...i.e. a “worse-case” scenario. Replacement of data for these outliers with the reanalyzed values improves the results by 1% for PCB204, due to the large number of fish composites (over 350) that we analyzed for DEQ (mean PCB204 recovery for the 24 reanalyzed samples was 88.7%; std dev 18.9%). In any event, if we obtained a “high” PCB204 recovery, corresponding PCB concentration data were correspondingly reduced, not increased by this correction. Thus, a 150% recovery of PCB204 would not result in a 1.5 times overestimation of total PCBs. See also the previous discussion of PCBs surrogates above.

**Impact of co-elution of other halogenated compounds with PCBs.** When dealing with complex matrices such as fish tissue, some coelution with non-PCBs indeed occur. However, it is typically limited to only a few PCB congeners. Also PCB and organochlorine concentrations tend to be positively correlated. Thus, when pesticide levels are high, corresponding PCB concentrations generally are as well. In other words the relative contribution of any coeluting pesticides to the PCB total is typically dampened (as, for example, seen in our VIMS/NIST Carp CRM comparison). While beyond the contract scope of this project, we (at our own cost) analyzed every fish composite in this project by GC/MS in the selected ion mode (SIM) for major organochlorine pesticides (listed below). These MS quantitation data were assessed relative to those derived from the ELCD PCB analyses. Our detailed manual inspection of each chromatogram further increased our confidence in the quantitations. When we observed apparent significant coelution (as discerned by poorly resolved peaks or an anomalously large individual congener contribution), we often also subjected samples to full scan MS to identity coeluters.

|                    |                    |                    |
|--------------------|--------------------|--------------------|
| alpha-bhc          | pcb 121 (sur-std*) | cis-nonachlor      |
| beta-bhc           | trans-chlordane    | endrin aldehyde    |
| pcb 30 (sur-std*)  | endosulfan I       | endosulfan sulfate |
| gamma-bhc          | cis-chlordane      | p,p' ddt           |
| delta-bhc          | trans-nonachlor    | endrin ketone      |
| Heptachlor         | p,p' dde           | Methoxychlor       |
| pcb 65 (sur-std*)  | Dieldrin           | pcb 204 (sur-std*) |
| Aldrin             | Endrin             |                    |
| heptachlor epoxide | endosulfan II      |                    |
| Oxychlordane       | p,p' ddd           |                    |

Commenter: Thomas J. Grizzard,  
Professor of Environmental Engineering and OWML Director

**COMMENT(S) AND RESPONSE(S):**

1. *[The comment applies to impounded waters in general, and the Occoquan Reservoir in particular. The following text, extracted from the comment document, summarizes the comment]* It appears to me that decisions to designate such systems as impaired due to low hypolimnetic DO should not be taken in the absence of a thorough assessment focused on the highest beneficial use of the impoundment. In the case of the Occoquan Reservoir, for example, it is clear that the impoundment is fully supporting its highest beneficial use as a drinking water supply.

As the DEQ Lake Assessment process continues, it is certain that a large number of impoundments will also be found to display identical symptoms of low hypolimnetic DO. In addition, many of these will be public water supplies. It would be unfortunate for waters that fully support this beneficial use to be labeled as “impaired” solely as a result of natural processes brought into play by the desire to provide surface water storage to meet societal needs. It is my hope that these cases will not become future examples of how the application of a single water quality standard, without due consideration of the natural processes that affect its attainability, can result in regulatory action that may be prohibitively expensive, perhaps unattainable, and probably unnecessary.

It is my hope that DEQ will recognize the unique set of problems posed in this case, and others like it. Certainly, there is a wealth of scientific expertise in the Commonwealth, and there would be no difficulty in commissioning an advisory group of experts and other stakeholders to consider these important issues. Thank you for the opportunity to comment. Please feel free to contact me if I can provide clarification of any of the comments contained herein, or if I can help in any way.

**Response:** The DEQ acknowledges the validity of your comments and appreciates the concerns raised. We will take these into consideration as plans to address the impairments identified in impounded waters in the 2002 303(d) list are developed later.

Commenter: Thomas Bonacquisti, Fairfax County Water Authority

**COMMENT(S) AND RESPONSE(S):**

1. ...As a member of NVRC's Occoquan Technical Advisory Committee, FCWA staff fully supports Resolution No. P03-03 titled, "Position Regarding the Proposed List Of The Occoquan Reservoir On The Department of Environmental Quality's 303(d) Total Maximum Daily Load Priority List" (attachment). In particular, FCWA strongly urges that the Reservoir not be placed on the 303(d) list for dissolved oxygen as the Reservoir naturally stratifies due to its depth causing lower levels in the hypolimnion of the Reservoir.

With regard to DEQ's current water quality standards and criteria, a distinction between free flowing waters and impounded reservoirs needs to be made. Free flowing streams and impounded reservoirs are inherently different and behave as such. Nutrient uptake mechanisms and especially dissolved oxygen processes are vastly different between the two. DEQ needs to recognize and address these differences. Establishment of appropriate criteria for impounded reservoirs (especially drinking water reservoirs) should be the next step in DEQ's continuing process of protecting the Commonwealth's water resources.

**Response:** DEQ acknowledges the validity of the comments offered by FCWA and will take these into consideration. The DEQ is proceeding with listing the Occoquan Reservoir in the *2002 303(d) Report on Impaired Waters* as impaired due to suppressed dissolved oxygen levels in the Reservoir. The source of the low dissolved oxygen is identified as the naturally occurring stratification of the Reservoir. While the stratification, and resulting low dissolved oxygen levels, may be a natural process, the DO measurements do not comply with the Water Quality Standards as they are currently written. The remedy to address the DO impairment may entail any one, or a combination, of several options. One option is to demonstrate that the low dissolved oxygen in the hypolimnion is a natural occurrence in accordance with 9 VAC 25-260-55. *Implementation procedure for dissolved oxygen criteria in waters naturally low in dissolved oxygen*. Another option may be to re-evaluate the currently applicable beneficial uses of the Reservoir. DEQ will seek the input and active participation of stakeholders in the Occoquan watershed as a plan to address the 303(d) listing of the Reservoir is developed.